

Species
of
European and Northamerican
Bryineæ (Mosses)

synoptically described

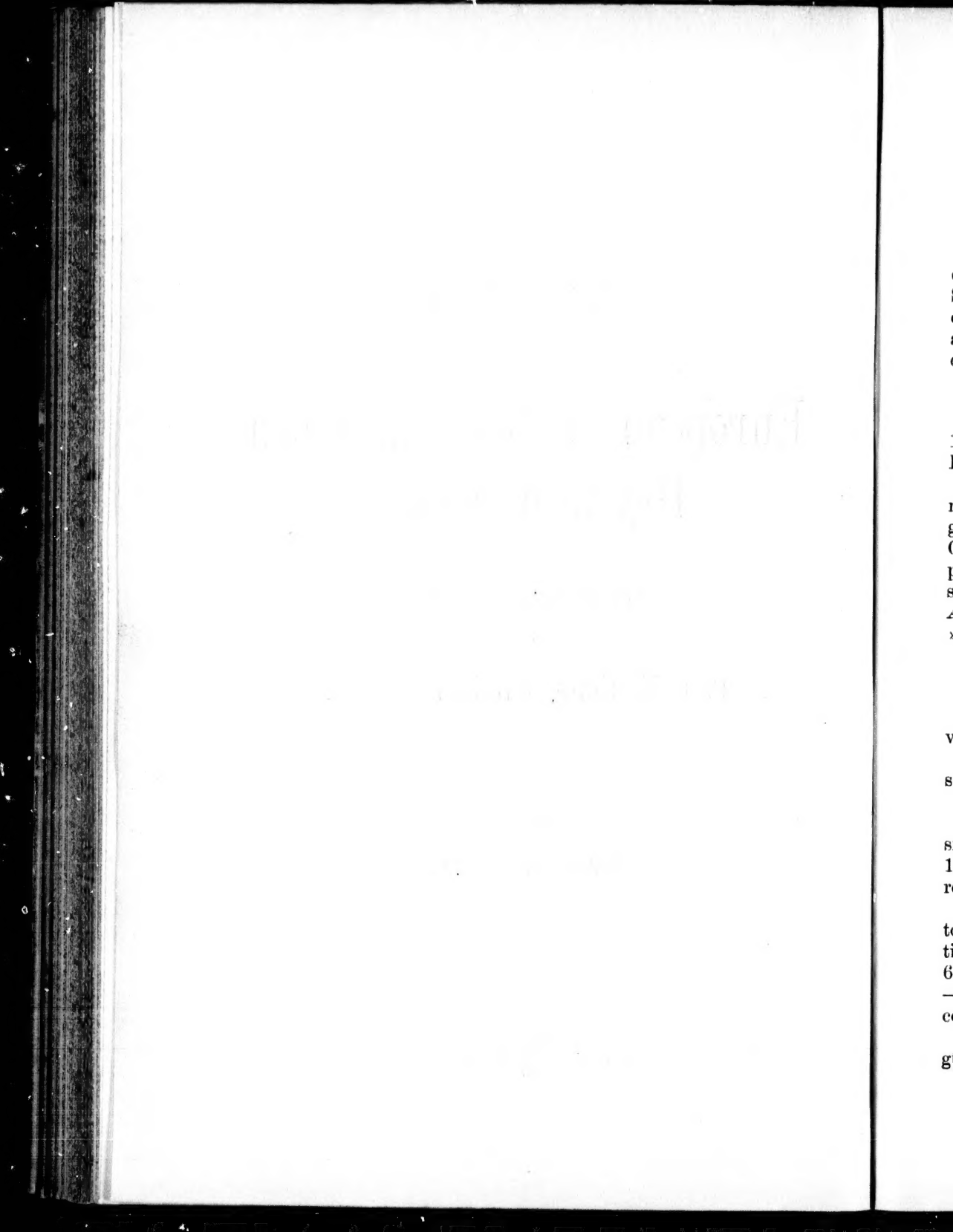
by

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Part. 2.

Acrocarpous.

Linköping,
Linköpings Litografiska Aktiebolag
1897.



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Fam. 15. **Schistostegaceæ.**

66. **Schistostega** Mohr.

1. **S. osmundacea** Dickson. — *Mnium* Dicks., *Schistostega* Mohr.

Lobes of the frons («leaves») suboblong short-acuminate acute entire; cells large. Capsule minute globose; pedicel elongate. Stem naked below, often with long basal shoots bearing a bud of ovate-lanceolate leaves. Prothallium (protonema) effulgent as a smaragd. — Dark caverns of sandstone rocks or (in Can.) on roots of stumps. *Eur.* not r. Sweden! *Amer. Can.*: Macoun.

Fam. 16. **Eustichiaceæ.**

67. **Eustichia** Bridel.

1. **E. imbricata** Desvaux. — *Fissidens* Desv.; *Eustichia* Kindb.; *E. norvegica* Brid. (incorrect name).

Leaves entire: lower short truncate or apiculate, upper acuminate; costa not excurrent. Perichetial leaves very much longer, long-subulate distantly crenulate, often hyaline at apex. Capsule globose chestnut-colored scarcely emergent above the points of perichetial leaves; pedicel shortish arcuate when moistened. Dioecious very r. fruit. — Shaded sandstone rocks r. *Amer. U. S.*: Sullivant; Cheney, fruit.; Roell; Mrs Britton. *Eur.* »Iceland: Vahl»; Schimper.

Fam. 17. **Polytrichaceæ.**

68. **Catharinea** Ehrhart.

1. **Lepidophyllæ.** Leaves undulate, furnished with transverse rows of scales at back. Mostly paroecious.

2. **Leiophyllæ.** Leaves not distinctly undulate, without scales. Dioecious.

1. **Lepidophyllæ.**

A. Leaves broader at base. Capsule strangulate; calyptra smooth.

1. **C. selwyni** Austin. — *Atrichum* Aust.; *Catharinea* Kindb. *revue bryol.* 1894.

Leaves broad oblong-lanceolate obtusate subobtusate, dentate to below middle, very chlorophyllose above, pellucid and sometimes rufescent below, spreading when moistened; lamellæ us. 6; costa dentate at back. Capsule nearly straight. Paroecious. — On earth or stumps r. *Amer. Can.*: Macoun. *U. S.*: Howell, com. Cardot; Leiberger, com. Mrs Britton.

B. Leaves narrowed at base. Capsule not or slightly strangulate; calyptra scabrous at apex.

a. Leaves limbate by 2 rows of linear cells; costa dentate above at back. Capsule cylindric.

2.C.undulata L. — *Bryum* L.; *Catharinea* Weber et Mohr; *Atrichum* Br. eur.

Leaves narrowly lanceolate acuminate acute, dentate also below middle, very chlorophyllose, spreading when moistened, gen. large and green; lamellæ us. 2—4. Capsule us. large curved; pedicel often very long. Paroecious or polygamous; male plants rare. — Earth and wet rocks princ. in lower regions, common. *Eur.* Sweden, Norway, Switzerl. *Amer.* Can.: Macoun. U. S.: Roell; Sullivant, com. C. Mueller.

3.C.Haussknechtii Juratzka et Milde. — *Atrichum* J. et M.; *Catharinea* Brotherus; *C. anomala* Bryhn.

Differs from the last: Leaves lanceolate short-acuminate subobtuse, less large. Capsules smaller and nearly straight, sometimes clustered. More often paroecious. — Wet earth in woods r. *Eur.* Norway: Bryhn. *Amer.* N. Foundl.: Waghorne.

4.C.angustata Bridel. — *Atrichum* Br. eur.

Leaves lanceolate or oblong-lanceolate short-acuminate subobtuse, entire below middle, faintly chlorophyllose and often subpellucid, patent when moistened, less large and less undulate than in the both last and gen. olive-green; lamellæ us. 5—7. Capsule less large and nearly straight; pedicel red shortish. Dioecious. Male plants abundant in separate tufts with cup-shaped flowers; perigonal leaves with thick costa. — Sandy and clayey earth, often on rocks and stone-walls. *Eur.* princ. in southern distr. Switzerl. *Amer.* more common. Can.: Macoun. U. S.: Wetherby.

***C.xanthopelma** C. Mueller. — *Atrichum* Lesq. et Jam.

Leaves more distinctly obtuse with smaller teeth. Pedicel of capsule long and pale. — *Amer.* r. U. S.: Boll, com. C. Mueller; Langlois, com. Renauld.

b. Leaves indistinctly limbate by one row of linear cells; costa nearly smooth. Fruiting stem unknown.

5.C.rosulata C. M. et Kindb.; *Atrichum* cat. Canad. m.

Shoot-leaves short rosulate: upper oblong-lanceolate subobtuse dentate above middle and scarcely undulate, spreading when moist, often without scales at back. — On old stumps r. *Amer.* Can. Brit. Col.: Macoun.

2. *Leiophyllæ.*

6.C.crispa James. — *Atrichum* Sulliv. icon. musc.

Leaves large distant obtusate obtuse oval-oblong or oblong-

lanceolate, denticulate above middle, narrowed at base; lamellæ us. 3; costa smooth at back. Capsule subcylindric or subclavate; pedicel not long. Stem often high. R. fruiting. — Clay soil or among grass near water. *Eur.* r. *Engl.*: Rogers. *Amer.* less r. *Can.*: Macoun (fruit.).

7.C.tenella Roehling. — *Atrichum* Br. eur.

Leaves somewhat small crowded acute not broad, suboblong or oblong-lanceolate not much narrowed below, denticulate also below middle; lamellæ 3—5; costa dentate above at back. Capsule small oblong; pedicel not long. Stem about 1 c. m. or lower. — Wet sandy soil in lower regions. *Eur.* princ. in northern distr. Sweden not r.!

69. **Oligotrichum** Lamarck et De Candolle.

A. Leaves narrow subvaginant us. brown, faintly crisped when dry.

a. Leaves with short lamellæ at back.

1.O.hercynicum Ehrh. — *Catharinea* Ehrh.; *Oligotrichum* Lam. et D. C.

Leaves dentate above at borders and at back, gradually narrowed, subulate or acute; lamellæ of upper side 8—12 cohering, those of under side 3—5 near base. Capsule suboblong not or slightly stragulate; pedicel not long; calyptra often with many hairs. — Sandy ground princ. in alps. *Eur.* less r. in northern distr. Norway! *Amer.* r. Alaska: J. M. Macoun.

2.O.integrifolium Kindb. revue bryol. 1894.

Differs from the last: Leaves broader, subobtus entire, smooth at back. Capsule thicker below, stragulate plicate when dry. — Alp. region r. *Amer.* *Can.* *Brit. Col.*: Macoun.

b. Leaves with long lamellæ at back.

3.O.aligerum Mitten; Sullivant icon. m.

Leaves longer than in the both last, sublinear subulate or acute, dentate at least above middle of borders; lamellæ of upper side 5—8 near costa, those of under side 3—5 near costa and 4—5 near borders. Capsule stragulate narrowly ovate-oblong or subcylindric; lid rostrate; pedicel thin very long; calyptra with few hairs in upper part. — Clay banks in alp. regions r. *Amer.* *Can.* *Brit. Col.*: Macoun.

B. Leaves broad large not sheathing, green, cirrate-crisped when dry; lamellæ long also at back, 3—6 near costa on upper side, 2—3 near costa and sometimes 1—2 rudimentary near borders at back.

4. O. parallelum Mitten. — *Atrichum* Mitt.; Sull. ic. m.; *Oligotrichum* Kindb. l. c.

Leaves sublanceolate (or in male plant oval-oblong) acute or short-acuminate, dentate to below middle, marked with longitudinal stripes at back; costa scarcely percurrent also in the nearly similar perichetial leaves. Capsule as in the last but thicker; lid rostrate; pedicel thick longish; calyptra unknown. — Wet rocks in alps r. *Amer.* Brit. Col. in higher alp. region: Macoun. *Eur.* Norway: E. Nyman.

5. O. leiophyllum Kindb. — *Atrichum* in bull. Torr. club.

Differs from the last: Leaves not striped, upper longer-acuminate; perichetial with still longer acumen and excurrent costa. Capsule longer. Calyptra nearly glabrous. — Damp earth in alp. regions. *Amer.* Alaska: J. M. Macoun. *Can.* Brit. Col. and Vanc. isl.: J. Macoun.

70. **Psilopilum** Bridel.

1. P. lævigatum Wahlenberg. — *Polytrichum* Wahl. fl. lapp.; *Psilopilum* Limpricht.

Leaves short ovate-oblong subobtuse crenulate above, not dentate at back. Capsule large broadly subovate more or less curved; pedicel not long. — Sandy or turfy soil in arctic distr. *Eur.* Spetsbergen: A. E. Nordenskiöld; Berggren. *Amer.* *Can.*: Breutel. Alaska: Palmer and J. M. Macoun. *Greenl.*: Berggren.

71. **Bartramiopsis** Kindb. revue bryol. 1894.

1. B. Lescurii James. — *Atrichum* Jam.; *Bartramiopsis* Kindb.; *Oligotrichum* Mitten.

Leaves linear-lanceolate short-acuminate, sharply dentate to the sheath, not much loosely disposed, more or less incurved when dry, nearly straight and spreading when moist; lamellæ 4—8. Stem 2—3 centim. long nearly eradiculose, naked and filiform below. (Described to specimens from Japan). »Capsule erect short cylindric-ovate constricted below mouth; pedicel short»: Lesq. et Jam. — *Amer.* »Alaska»: Lesq. et Jam. (Japan: Bisset, determ. Mitten).

* **B. sitkana** Kindb. l. c.

Leaves longer, long-subulate more loosely disposed, cirrate when dry. Capsules unknown. Habit of *Bartramia crispa*. — *Amer.* Alaska, Sitka: J. M. Macoun.

72. **Catharinella** Kindb. rev. bryol. 1894.

A. Leaves short-acuminate sheathing; marginal teeth large with a single red cell at apex; lamellæ 20—30. Stem and pedicel not long.

1.C.contorta Menzies. — Catharinea Mz.; Pogonatum Sull. ic. m. in part.

Leaves dark green sublinear acute strongly dentate nearly all around; cells of sheath chlorophyllose subquadrate; lamellæ about 30, their cells rotundate green; costa dentate at back, not excurrent. Capsule narrow subcylindric strangulate not large; peristomial membrane elevate; pedicel contorted. — On roots of trees (Douglas-firs) r. *Amer.* Pacif. distr. Alaska: J. M. Macoun. Can. Brit. Col.: J. Macoun. U. S.: Hall, com. Macoun.

2.C.atrovirens Mitten. — Pogonatum Mitt.

Differs from the last: Leaves shorter, more distinctly sheathing, bright or glaucous green, more strongly crisped; cells of sheath hyaline; lamellæ about 20. — Roadsides r. *Amer.* Can. Brit. Col.: Macoun.

B. Leaves long acuminate not sheathing; marginal teeth large with 2—3 red cells; lamellæ about 40. Stem and pedicel very long.

3.C.erythrodontia Kindb. l. c. — Pogonatum contortum Sull. l. c. in part.

Habit of *C. contorta*. — Wet woods r. *Amer.* Alaska: J. M. Macoun. Can. Brit. Col. and Vanc. isl.: J. Macoun.

C. Leaves short-acuminate short-sheathing; marginal teeth not large, formed by one single cell, finally pale yellow not red; lamellæ about 20. Capsules unknown. Stem not long.

4.C.Dixonii Braithwaite. — Catharinea Braithw. brit. mossfl.; Catharinella Kindb. rev. bryol. 1894.

Leaves dark green not long, linear-lanceolate acute, dentate above gen. to middle, broadly bordered by wings of lamina often nearly all around; cells of sheath subquadrate not chlorophyllose; costa short-excurrent dentate at back. — On base of trees r. *Eur.* Engl.: Dixon, com. Braithwaite.

73. **Polytrichum** L.

A. Calyptra short-acuminate densely hairy.

a. Capsule papillose. Leaves often incurved when dry, r. aristate.

I. Aloidella. Capsule without angles and apophysis.

b. Capsule smooth. Leaves rigid not incurved, gen. aristate.

II. Pogonatum. Capsule without angles and apophysis, green when unripe, finally blackish or r. brown. Stem us. branched. Apical cell of lamellæ thick-walled subglobose papillose.

III. Eu-Polytrichum. Capsule (ripe) with 4—6 angles and

us. distinct apophysis, soon becoming brown. Stem us. simple. Apical cell of lamellæ smooth or unipapillate.

B. Calyptra long-acuminate sparingly hairy.

IV. Polytrichadelphus. Capsule smooth with 2 angles; apophysis none. Leaves rigid not incurved. Stem branched.

I. Aloidella C. Mueller syn.

A. Leaves incurved when dry; cells of lamellæ smooth thin-walled; costa not excurrent. Stem us. short simple. Protonema often persistent.

a. Upper leaves long narrow subulate, broadly sheathing; wings of lamina very broad; lamellæ about 10.

1. P. pennsylvanicum Hedwig; C. M. syn. — Pogonatum brevicaule Beauvois; Sulliv. icon. musc.

Lower leaves short short-acuminate, upper distantly dentate or crenulate. Capsule subcylindric. Stem very short. — Clayey soil by roadsides. *Amer.* eastern slope. *Can.*: Macoun; Fowler; N. Foundl.: Waghorne. *U. S.*: Sullivant, com. C. Mueller; Austin; Olney; Cummings.

b. Leaves broad obtusate not long; lamellæ numerous.

2. P. nanum Schreber. — *P. subrotundum* Hudson; Braithwaite.

Leaves subobtusate faintly crenulate above; wings of lamina somewhat broader below. Capsule finally short-piriform. Stem simple not high. — Sandy or clayey soil. *Eur.* not r. in lower regions. Sweden!

3. P. brachyphyllum Richard. — Pogonatum Sulliv. icon. m.

Differs from the last: Leaves obtuse entire; capsule suboval; stem shorter. — Roadsides. *Amer.* *U. S.*: Austin; Langlois, com. Cardot.

4. P. aloides Hedwig. — Pogonatum Beauvois.

Leaves sharply dentate us. somewhat short, less broad than in the both last and gen. longer acuminate; wings of lamina narrow. Capsule oblong-piriform or subcylindric. Stem often somewhat high r. branched. — Sandy soil. *Eur.* not r. Sweden, Germany, Switzerl.!

B. Leaves not incurved but gen. appressed when dry, us. sharply dentate with narrow wings; lamellæ numerous, their apical cell thick-walled papillose or crenulate. Stem r. simple.

a. Leaves sharply dentate. Stem us. branched.

5. P. urnigerum L. — Pogonatum Beauvois.

Leaves acute more or less acuminate, gen. not aristate, often somewhat long; apical cell of lamellæ globose. Perichetial leaves aristate. Capsule subcylindric us. large and not wide-

mouthed; pedicel thin often very long. — Earth and rocks also in higher alp. regions. *Eur.* common. Sweden, Norway, Switzerl. *Amer.* Can.: Macoun; Waghorne. Alaska: J. M. Macoun.

6. *P. dentatum* Menzies; C. M. syn. — *Pogonatum* Sull. ic. m.

Leaves as in the last but more sharply dentate, the upper with short reddish or whitish awn by the excurrent costa; apical cell of lamellæ truncate crenulate. Capsule small narrow often wide-mouthed; pedicel not long. Stem not high, sometimes simple. Resembles a small alpine variety of the last. — In alps and arctic distr. r. *Amer.* Alaska: J. M. Macoun. Can. Brit. Col. and Labrador: Macoun. U. S.: Austin; Oakes.

b. Leaves faintly denticulate. Stem often simple.

7. *P. capillare* Richard. — *Pogonatum* Sulliv. ic. m.

Leaves short obtusate subobtuse distantly denticulate; wings of lamina not prominent; apical cell of lamellæ truncate crenulate; costa not excurrent. Capsule oblong-cylindric faintly papillose, not wide-mouthed. Habit of the last. — Alps and arctic distr. r. *Eur.* Russia: Brotherus. *Amer.* U. S.: Rudkin, com. Mrs Britton.

8. *P. Wahlenbergii* Kindb. rev. bryol. 1894. — »*P. capillare* var. minus Wahlenberg fl. lapp.»: Lindb. et Arnell.

Differs from the last in leaves subacute nearly entire; wings of lamina prominent, very much broader below. Capsule oval or cylindric. — Northern alp. distr. r. *Eur.* »Sweden»: Wahlenb. (Asia, Siberia: H. W. Arnell).

II. *Pogonatum* Bridel, in part.

A. Leaves falcate when moist, patent or spreading when dry; lamellæ about 60. Outer perichetial leaves very much longer. Pedicel of capsule finally brown.

9. *P. Macounii* Kindb. bull. Torr. club 1889.

Leaves very long, bordered by the wings of the strongly dentate lamina, long-subulate; awn long rough reddish. Perichetial leaves rough near apex, the inner shorter more acute. Capsule oblong-cylindric strangulate, larger than in *P. alpinum*; lid large conic-subulate, half as long as capsule. Higher and more robust than allied species. — Rocks and earth princ. in alp. region r. *Amer.* Pacif. distr. Can. to 1350 metr. a. s.: J. Macoun. Alaska: J. M. Macoun.

B. Leaves straight or faintly curved when moist, more or less appressed when dry; lamellæ about 30. Perichetial leaves not longer. Pedicel yellowish.

a. Leaves distinctly bordered by the wings of lamina, acuminate, gen. long and not strongly appressed when dry.

10. **P.alpinum** L. — *Pogonatum* Roebling.

Leaves dentate nearly to the sheath, very patent when moistened; awn short rough reddish also in perichetial leaves, which in upper part are furnished with few lamellæ. Capsule us. oblong (r. subcylindric) and not or slightly oblique; lid gen. long-rostrate. Stem us. branched above. — Stony and grassy places on mountains princ. in alps. *Eur.* common in alps. Norway, Switzerl. *Amer. Greenl.:* Berggren. Alaska: J. M. Macoun; Palmer. Can.: J. Macoun. U. S.: Roell. — A var. with subcylindric capsule is found in Can. Northern Labrador by J. Macoun 1896.

* **P.brevifolium** R. Brown.

Leaves very short, appressed when dry. Capsule globose. — In higher alp. region r. *Eur.* Norway! Sweden: E. Nyman. *Amer. »Greenl.:* Vahl: Lange.

11. **P.microdontium** Kindb. in *Biblioth. botan.* 42 (1897). — *Pogonatum alpinum* var. *microdontium* Kindb. cat. Canad. m.

Leaves entire or minutely denticulate only in upper third or half of lamina, longer-subulate than in *P. alpinum*; uppermost leaves very long, suddenly larger and spreading; awn reddish somewhat long, faintly rough. Perichetial leaves with very long nearly smooth awn; lamellæ somewhat numerous. Capsule large thick globose or broad-oval, often oblique; lid short-apiculate. Stem gen. simple. — Alpine princ. arctic districts r. *Amer. Greenl.:* Vanhoeffen. Alaska: J. M. Macoun; Palmer. Can. Brit. Col.: J. M. Macoun.

12. **P.Vanhoeffeni** Findb. in *Biblioth. botan.* 42 (1897).

Leaves entire or only near apex (scarcely in upper third of lamina) dentate, not long but long-acuminate, very narrowly bordered by lamina, nearly appressed when dry, not much open when moist; awn short rough red-yellow. Perichetial leaves much narrower with not few lamellæ. Capsule obovate oblique; lid scarcely shorter than half capsule. Stem us. sparingly divided above, often to 8 c. m. high; pedicel scarcely 3 c. m. Tufts brownish. — *Amer. r. Greenl.:* E. Vanhoeffen.

b. Leaves bordered by wings of lamina only near apex, short acute but gen. obtusate, appressed when dry.

13. **P.septemtrionale** Swartz; Wahlenberg fl. lappon., not C. M. syn.; Kindb. *revue bryol.* 1894.

Leaves entire or with very few teeth near apex; awn very

short or indistinct. Perichetial leaves short-apiculate nearly without lamellæ. Capsule globose or broad-oval; lid short-apiculate. Stem low simple or very slightly branched. Habit of *P. sexangulare*. — Higher alp. region r. *Eur.* Norway! *Amer.* Can.: J. Macoun. Alaska: J. M. Macoun. Greenl.: Vanhoeffen. 14. **P. polare** C. Mueller.

Differs from the last in more distinct and dentate awn of leaves; capsule oval after oblique; stem divided somewhat high. — Arctic distr. r. *Amer.* Greenl.: Pansch, com. C. Mueller.

III. *Eu-Polytrichum*.

A. Capsule green and not distinctly angled when unripe, us. 6-angled when ripe. Leaves channelled or with inflexed wings, not appressed when dry; awn red-brown or indistinct; apical cell of lamina not papillate. Stem simple.

15. **P. sexangulare** Floerke. — *P. septemtrionale* C. M. syn.

Leaves short obtusate obtuse entire or at apex with very few teeth, not rough at back; wings very narrow or indistinct; lamellæ about 30; awn indistinct or very short and red. Capsule suboval finally short-prismatic; pedicel yellowish or pale red not long. Stem not tomentose us. low. Habit of *P. alpinum*. — On earth in higher alp. region. *Eur.* less r. Norway! Sweden: Indebétou. *Amer.* r. Can. Brit. Col.: Macoun. U. S.: Roel.

16. **P. gracile** Dickson; Menzies.

Leaves long subulate-acuminate dentate to the sheath, us. green; wings broad princ. below; lamellæ about 40; awn brownish not long. Perichetial leaves hyaline-bordered. Capsule round-oval finally cubic; apophysis sometimes less distinct; lid broad-conic when young, finally apiculate or rostellate; pedicel long yellowish or finally reddish. Spores about 0.02 m. m. Stem us. tomentose below, often high. — Turfy soil and rocks also in alps. *Eur.* not r. Sweden, Norway! *Amer.* not common. Can.: Macoun.

B. Capsule 4-angled prismatic soon becoming brown. Leaves acuminate acute with distinct wings.

a. Leaves entire or above with few teeth, channelled or convolute; apical cell of lamellæ unipapillate. Perichetial leaves hyaline above.

17. **P. juniperinum** Willdenow.

Leaves long long-subulate gen. entire, very patent or curved when moist, us. not appressed when dry; lamellæ about 50; costa rough above at back; awn long rough wholly red.

H. ex.

Perichetial leaves entire somewhat long-acuminate, lamellate above; awn rough and red. Capsule rectangular-prismatic; pedicel often very long. Stem not much naked and gen. not tomentose, sometimes branched. — Heaths and woods common but less often in alps. *Eur.* Sweden, Norway, Switzerl! *Amer.* Can.: J. Macoun. Alaska: J. M. Macoun.

18. *P. strictum* Banks.

Differs from the last: Leaves shorter with shorter acumen, us. appressed when dry; lamellæ about 30. Capsule cubic; pedicel less long. Stem tomentose us. simple. — Swamps princ. in alps not common. *Eur.* Norway! *Amer.* Can.: Macoun; Waghorne. Greenl.: Vanhoeffen.

19. *P. hyperboreum* R. Brown.

Leaves short short-acuminate entire, straight and not much patent when moist, appressed when dry; lamellæ about 30; costa smooth; awn short faintly rough, often (at least in upper leaves) partly whitish, in some leaves wholly red. Perichetial leaves entire somewhat long-acuminate; awn whitish above, nearly smooth. Stem of female plants branched often tomentose. Capsule cubic; pedicel not long. Male plant with shorter broader leaves, disposed in distant fascicles. Habit of the last. — Dry and wet places in northern alps. *Eur.* Norway! Finl.: Brotherus. *Amer.* Greenl.: Berggren; Vanhoeffen. Can. N. Labrador: Macoun 1896.

20. *P. boreale* Kindb. Laubm. Schwed. u. Norw.

Differs from the last: Leaves gen. dentate near apex below the awn, with longer acumen; costa rough at back; awn longer always whitish above. Perichetial leaves more distinctly denticulate; awn rough nearly wholly whitish. Stem not tomentose. — Dry places in northern alps r. *Eur.* Norway in Dovrefjeld! *Amer.* Greenl.: Berggren; Vanhoeffen. Alaska: J. M. Macoun. Can. Labrador: Waghorne.

21. *P. piliferum* Schreber.

7+82.
Leaves short entire short-acuminate or subobtusate, appressed when dry; lamellæ about 30; costa smooth; awn long wholly whitish nearly smooth. Perichetial leaves not lamellate. Capsule short-prismatic or cubic, inclined or suberect. Stem short simple, naked at least in lower half; the foliated part subclavate. — Dry heaths also in alp. regions common. *Eur.* Sweden, Norway! *Amer.* Can.: Macoun.

b. Leaves denticulate not convolute, long and long-subulate,

us. plane; lamellæ very numerous, their apical cell not papillate; awn red-brown. Stem and pedicel us. long.

22. *P. attenuatum* Menzies. — *P. formosum* Hedwig.

Leaves plane crowded, dentate to a long sheath, us. green; wings very narrow; apical cell of lamellæ suboval. Perichetial leaves green not or faintly hyaline in lamina; awn rough. Capsule us. long rectangular-prismatic brown; lid short broad-conic with short point; pedicel reddish. Spores about 0,01 m. m. Stem tomentose near base. — Dry woods often in subalp. districts. *Eur.* not r. Sweden! *Amer.* r. Can.: J. Macoun; Waghorne. Alaska: J. M. Macoun.

*** *P. pallidisetum*** Funck.

Capsule short-prismatic yellowish; lid nearly flat with narrowly conic beak; pedicel yellowish or pale red. — Woods r. *Eur.* Sweden, Germany! *Amer.* »U. S.«: Lesq. et Jam.

23. *P. ohioense* Renauld et Cardot. — *P. decipiens* Limpricht.

Differs from *P. attenuatum*: Upper leaves (near the perichetial) with shorter sheath; apical cell of lamellæ often transversely dilated. Capsule shorter, narrowed below; lid with narrowly conic beak. Stem not tomentose, us. less long. — Earth and rocks in woods. *Eur.* r. Switzerl! *Amer.* not r. Can.: Macoun; Waghorne. U. S.: Wetherby; Lapham, com. Cardot.

24. *P. Behringianum* Kindb. rev. bryol. 1894.

Differs from *P. attenuatum*: Leaves laxly disposed, entire below middle of lamina, faintly denticulate above, nearly channelled; cells of sheath shorter and broader. Stem not tomentose. Capsules unknown. — Arctic distr. r. *Amer.* Alaska: J. M. Macoun.

25. *P. commune* L.

Leaves plane crowded, dentate to the sheath, us. rufescent, often falcate when moist; apical cell of lamellæ often emarginate. Perichetial leaves hyaline, us. serrulate near apex; awn entire. Capsule long or short; lid short-rostellate with us. narrow beak. Stem not often tomentose, us. very long. — Heaths and turf-moors princ. in lower regions, less often in alps. *Eur.* common. Sweden! *Amer.* less common. Can.: Macoun (a var. with shorter stem and us. blackish calyptra).

*** *P. perigoniale*** Michaux.

Leaves not or faintly rough at back, us. green; perichetial entire more numerous. Capsule short. Stem and pedicel less long. — Dry places. *Eur.* princ. in southern distr. Switzerl! *Amer.* Can.: Macoun.

* **P. Swartzii** Hartman.

»Leaves short about 5 m. m. Capsule small subcubic with less distinct apophysis. — *Eur.* r. Sweden»: Hartman skand. flora.

26. **P. conorhynchum** Kindb. cat. Canad. m.

Differs from *P. commune*: Leaves channelled green, perichetial longer aristate. Lid of capsule with broadly conic beak. — Bogs in alps r. *Amer.* Can. Selkirk mts: Macoun.

IV. **Polytrichadelphus** Mitten.

27. **P. Lyallii** Mitten. — *Polytrichadelphus* Mitt.; *Polytrichum* Kindb. revue bryol. 1894; *Oligotrichum* Lindb.; Sull. ic. musc.

Leaves dentate above often to the middle of the prominent lamina, not appressed; awn short smooth also in perichetial leaves; lamellæ about 30, their apical cell thick-walled suboval smooth. Perichetial leaves subconvolute densely lamellate at the short point. Capsule subovoid-cylindric strangulate finally brown; peristomial membrane elevate; lid long-rostrate; pedicel yellowish. Resembling *P. alpinum* and *P. sexangulare*. — Swampy places in higher alp. region. *Amer.* Pacif. distr. r. U. S.: Roell; Nowell.

Fam. 18. **Georgiaceæ.**

74. **Georgia** Ehrhart.

I. **Tetraphis.** Leaves distinctly costate; upper cells round-hexagonal. Peristomial teeth narrow. Stem elongate.

II. **Tetrodontium.** Leaves not distinctly costate; upper cells suboval. Peristomial teeth broad. Stem nearly indistinct.

I. **Tetraphis** Hedwig.

A. Pedicel of capsule smooth.

1. **G. pellucida** L. — *Mnium* L.; *Georgia* Rabenhorst.

Leaves subovate or suboblong, obtusate us. acute. Perichetial leaves with long sublinear us. obtuse acumen; costa not excurrent. Capsule and pedicel straight. Sterile stems gemmiferous at the top, their buds cup-shaped; upper stem leaves very small. — Rotten logs, sandstone and turfy soil in woods. *Eur.* common. Sweden, Switzerl. *Amer.* not r. Can.: Macoun; Waghorne. U. S.: Roell.

2. **G. cuspidata** Kindb. revue bryol. 1893.

Leaves subovate short-acuminate acute. Perichetial leaves cuspidate by the long-excurrent costa. Capsule gen. curved; pedicel straight. — *Amer.* Can.: Macoun. U. S.: Sullivant and Schrader, com. C. Mueller; Miss C. Cummings, com. Roell.

B. Pedicel rough.

3.G.trachypoda Kindb. l. c.

Leaves subovate or ovate-oblong, short-acuminate acute. Perichetial leaves with long sublinear acute acumen; costa not excurrent. Capsule straight; pedicel straight, rough in upper part. — *Amer.* Pacif. distr. r. *Can.* *Brit. Col.*: Macoun.

4.G.geniculata Girgensohn. — *Tetraphis* Girg.; Georgia Lindb.

Leaves ovate-lanceolate or ovate-oblong long-acuminate acute. Perichetial leaves ovate-lanceolate with long subulate acumen; costa not excurrent. Capsule straight; pedicel geniculate very rough above the bend. — Rotten wood r. *Amer.* princ. in Pacif. distr. *Can.*: Macoun; *N. Foundl.*: Waghorne. *Alaska*: J. M. Macoun. *U. S.*: Leiberg, com. Mrs Britton.

II. Tetrodontium Schwægrichen.

5.G.Brownii Dickson. — *Bryum* Dicks.; Georgia C. M.

Perichetial leaves ovate-oblong or ovate-lanceolate short-acuminate subacute. Capsule suboval straight very small; pedicel straight smooth. Perigonal leaves subulate-acuminate. Stem bearing at base shoots and long narrowly cuneate often 2—3-lobed leaves, resembling branches of a fallow-buck. — On shady rocks princ. of sandstone, sometimes covered by other mosses. *Eur.* somewhat r. *Norway*, *Sweden* *Amer.* r. »*U. S.*»: Lesq. et Jam.

Fam. 19. Fissidentaceæ.

75. Fissidens Hedwig.

A. Leaves nerveless hyaline narrowly limbate.

I. Aneuron. Pedicel of capsule terminal. Plants minute.

B. Leaves costate.

II. Pachyfissidens. Leaves pluristratose not limbate, large and entire.

III. Aloma. Leaves unistratose not limbate.

a. Peristomial teeth wholly deflexed when dry.

1. Camptodontii. Capsule terminal. Plants small. Dioecious. Leaves in few pairs.

b. Peristomial teeth suberect or inflexed when dry.

aa. Capsule terminal; lid very short conic obtuse.

2. Obtusifolii. Leaves broad-obtuse entire and small. Plants small.

bb. Lid of capsule rostrate or rostellate, gen. long.

3. Adiantoides. Capsule gen. not terminal. Leaves serrate

above and denticulate below, r. nearly entire, us. large and papillose at back.

4. **Osmundoides**. Capsule terminal or (in *F. taxifolius*) basilar. Leaves uniformly crenulate all around, gen. not large.

IV. **Eu-Fissidens**. Leaves unistratose limbate (in *F. exiguus* sometimes not limbate), gen. small and entire or at apex faintly denticulate. Capsule terminal or (in *F. floridanus*) lateral; lid gen. rostellate (in *F. rufulus* very short obtuse).

I. Aneuron Kindb.

1. **F. hyalinus** Hooker et Wilson; Sulliv. icon. musc.

Leaves entire in few pairs: lower very small, uppermost suboblong subacute much larger; wings short sinuate; cells large round-hexagonal. Capsule oval-obovate or suboblong; lid as long; teeth deeply cleft; calyptra conic covering only the beak. — Moist rocky ledges r. *Amer.* »U. S. Ohio«: Sullivant.

II. Pachyfissidens C. Mueller.

2. **F. grandifrons** Bridel.

Leaves rigid sublinear obtuse very densely crowded; cells roundish; costa not percurrent. Tufts dense high. Dioecious. Capsules unknown. — Wet calcareous rocks r. *Eur.* France: Spain: Levier. *Amer.* Can.: Macoun. — »The fruiting *F. grandifrons* from Asia« Barnes and Limpricht is *F. subgrandifrons* C. Mueller in Bot. Zeit. 1864.

III. Aloma Kindb.

1. Camptodontii.

3. **F. closteri** Austin; Sulliv. icon. muscor.

Leaves entire short-ovate subacute often with wanting lamina, very minute and pellucid. Capsule narrow subclavate erect or inclined; lid rostrate. Calyptra mitriform or cucullate. Plant minute. — On the ground r. *Amer.* »U. S.: Austin«: Sullivant.

4. **F. pauperculus** Howe.

Leaves uniformly crenulate, suboblong or short-lanceolate subacute, larger than in the last; cells chlorophyllose pellucid. Capsule narrow subcylindric often slightly curved, cernuous. Calyptra cucullate. Plants small not or very loosely tufted. — Stony ground r. *Amer.* U. S. California: M. A. Howe.

2. Obtusifolii.

5. **F. obtusifolius** Wilson; Sull. ic. m. — *F. Arnoldi* Ruthe.

Leaves oval-oblong pellucid; costa not percurrent. Capsule suboval. — Wet sandstone or calcareous rocks r. *Amer.* U. S.: Henry, com. Cardot. *Eur.* »Germany«: Limpricht.

3. Adiantoides.

A. Leaves long sublinear or oblong-lanceolate more or less pellucid. Capsule large; pedicel long-exserted.

6. *F. adiantoides* L. — Hypnum L.; Fissidens Hedwig.

Capsule oval-oblong; lid nearly as long; teeth deeply cleft; pedicel lateral. Leaves strongly serrate above, denticulate below, often hyaline at margins, us. large; costa subpercurrent. Stems us. erect and tufted, forming large mats, gen. radiculose below. — Rocks and earth common. *Eur.* Sweden, Switzerland. *Amer.* Can.: Macoun.

* ***F. cristatus* Wilson.** — *F. decipiens* Notaris; Sulliv. icon. musc.

Leaves more crowded and not much large, nearly entire below. Stems us. ascending or decumbent, densely tufted. — On rocks, less often on earth, nearly common. *Eur.* Sweden, Switzerland. *Amer.* Can.: Macoun. U. S.: Sullivant, com. C. Mueller.

* ***F. subtaxifolius* Kindb.** in bull. soc. bot. ital. 1896.

Leaves minutely serrate above, nearly entire below; costa percurrent or subexcurrent. Stems (as in *F. taxifolius*) short decumbent without rhizoids above base, not forming cohering mats. Capsules not found. — On clayey earth. *Eur.* Switzerland near Lugano!

7. *F. serrulatus* Bridel.

Capsule subcylindric; lid shorter; teeth deeply cleft; pedicel terminal on the stem or on short lateral branches. Leaves as in *F. adiantoides* but more densely crowded, always large. Tufts loose not radiculose. R. fruiting. — Earth and rocks r. *Eur.* Italy: Bottini. Portugal: Levier.

8. *F. polyphyllus* Wilson.

Differs from the last: Peristomial teeth cleft only to middle. Leaves entire or near apex faintly denticulate or serrate. Stem us. much longer. Very r. fruiting. — Wet shady rocks r. *Eur.* France: Camus, com. Husnot. Engl.: Manchester Cryptog. Society.

9. *F. polypodioides* Hedwig; Sulliv. ic. musc.

Capsule piriform-clavate with very wide mouth, not strangled; lid shorter; teeth deeply cleft; pedicel as in *F. serrulatus*. Leaves entire large densely crowded; costa subpercurrent. Stem often long and simple, radiculose only at base. Differs from the 3 preceding species in annulus of capsule revolvable. R. fruiting. — Wet rocks r. *Amer.* »U. S. southern states«: Sulliv. (Venezuela: Fendler, com. C. Mueller).

B. Leaves short suboblong nearly opaque below, pellucid at apex. Capsule small; pedicel scarcely exerted above upper stem-leaves.

10.F.subbasilaris Hedwig; Sullivant *ic. musc.*

Capsule oblong-cylindric; lid much shorter; teeth not long and not deeply cleft with subulate not filiform-pointed legs; pedicel emerging from lower part of stem. Leaves small, denticulate below, stronger serrate near apex, subobtusate, not hyaline at margins; costa subpercurrent. Tufts low; stems fasciculate -- On trees *r. Amer. Can.*: Dearness, com. Macoun; Drummond, com. Macoun. U. S.: Sullivant, com. C. Mueller.

4. *Osmundoidei.*

A. Leaves gen. large; costa excurrent. Stems not tufted. Pedicel of capsule basilar.

11.F.taxifolius L. — Hypnum L.; Fissidens Hedwig.

Leaves suboblong hyaline-crenulate often acute, not densely crowded. Capsule suboblong; lid nearly as long. Stems fasciculate; branches simple not long us. decumbent. — On earth. *Eur.* not *r.* Sweden: S. Hardin; M. Huss. *Engl.*: Rogers. *Amer.* »U. S.»: Lesq. et Jam.

B. Leaves not large; costa not excurrent. Pedicel terminal.

a. Tufts tomentose often high. Calyptra mitriform lobate.

12.F.osmundoides Swartz. — Dicranum Sw.; Fissidens Hedwig.

Leaves suboblong subobtusate often apiculate, not opaque, in many pairs; costa subpercurrent. Capsule oblong-oval. — Wet rocks and heaths also in alps. *Eur.* not *r.* Sweden, Norway! *Amer. Can.*: Macoun.

b. Stems low not tomentose, not or very loosely tufted. Calyptra cucullate.

13.F.exilis Hedwig.

Leaves very pellucid suboblong subacute in few pairs; upper sometimes sublinear-lanceolate; costa percurrent. Capsule thick oval-oblong. Monoecious. Plants very small. — On earth. *Eur.* not *r.* Sweden: C. Hartman; Arvén. France: Husnot.

* **F.Hallii** Austin.

»Plants somewhat larger; dioecious. — *Amer. r.* U. S. Texas: E. Hall»: Lesq. et Jam.

14.F.Ravenelii Sullivant *icon. muscor.*

Leaves small opaque sublinear or broad-lanceolate subacute in 2—10 pairs; costa subpercurrent. Perichetial leaves with broadly limbate wings. Capsule suboblong gen. erect; lid rostellate much shorter. Dioecious. — Damp earth *r. Amer.* U. S.: Langlois, com. Cardot.

15. *F. Garberi* Lesq. et Jam. man.

Differs from the last: Leaves somewhat larger shorter more obtuse, sometimes short-acuminate; costa shorter. Perichetial leaves with narrowly limbate wings. Capsule oval. »Sometimes synoecious»: Schimper. — Trees and earth r. *Amer. Can.*: Macoun.

16. *F. Donnellii* Austin. — *F. pauperculus* Howe ?

»Leaves small: lower broad, upper longer and narrower linear-lanceolate in 3—4 pairs; basal lamina incomplete; cells much larger than in *F. Ravenelii*; costa not percurrent. Perichetial leaves with not limbate wings. Capsules unknown; pedicel very short. Dioecious»: Lesq. et Jam. man. and Barnes bot. gaz. 1887. — Base of trees r. *Amer.* »U. S., south. st.»: Lesq. et Jam.

IV. *Eu-Fissidens*.

A. Inner leaf-cells opaque.

a. Lid of capsule very short obtuse.

17. *F. rufulus* Bryol. eur. — *F. ventricosus* Sulliv. icon. m.

Leaves broad somewhat large, oblong or oblong-lanceolate subobtuse crowded, broadly yellowish or reddish limbate; costa percurrent. Capsule obovate dark green; teeth deeply cleft; pedicel short. Stem 1—4 c. m. long. Very r. fruiting. — Stones in streams r. *Eur. Engl.*: Rogers. Austria: Sauter, com. Husnot. *Amer.* »Calif.»: Sulliv.

b. Lid rostrate.

18. *F. limbatus* Sullivant.

Leaves small oblong-lanceolate apiculate or short-acuminate, pale-limbate entire; cells seriate; costa subpercurrent. Capsule asymmetric suboval green; lid half as long; teeth deeply cleft; pedicel terminal. Stem 2—5 m. m. long. — *Amer. Pacif. distr.* r. U. S.: Roell; Howe.

19. *F. floridanus* Lesq. et Jam.

»Leaves long cultriform crenulate at apex; costa not percurrent. Capsule oblong-oval; lid long-rostrate; pedicel lateral. Stem 1—3 c. m. long. — *Amer.* r. U. S. south. states: Garber»: Lesq. et Jam.

B. Leaves more or less pellucid, not large. Lid shorter than half capsule. Plants small.

a. Leaves with thick broad limb. Stem us. somewhat long.

20. *F. rivularis* (Spruce as var.) Bryol. eur.

Leaves broadly cultriform acute or abruptly short-acuminate entire with pale limb; costa percurrent. Capsule straight cer-

nuous. Stem to 3 c. m. long; male flowers axillary. — In water r. *Eur.* France: Husnot. *Amer.* »U. S.: Lesq. et Jam.
21. *F. crassipes* Wilson.

Leaves as in the last but with yellowish limb, sometimes crenulate near apex; costa not percurrent. Capsule us. straight erect. Stem to 4 c. m. long. Dioecious or monoecious with not axillary male flowers. — In water r. *Eur.* Switzerl.! France: Berthoumieu; Camus.

* ***F. Mildel*** Schimper. — Polygamous. — *Eur.* r. Switzerl.: Culmann, com. Husnot.

b. Leaves gen. with thin narrow limb, not gradually acuminate; costa gen. not excurrent. Stem us. very short.

22. *F. bryoides* L. — *Hypnum* L.; *Fissidens* Hedwig.

Leaves broadly cultriform acute us. long. Capsule straight gen. erect. Stem with axillary male flowers. — Earth and stones not r. *Eur.* Sweden, Switzerl.! France: Husnot. *Engl.*: Rogers. *Amer.* Can.: Macoun; Drummond.

* ***F. cyprius*** Juratzka.

»Polygamous. — *Eur.* r. Italy»: Limpricht.

* ***F. viridulus*** Swartz. — *Dicranum* Sw.; *Fissidens* Wahlenberg. Fruiting stem without male flowers. — *Eur.* not r. *Engl.*: Rogers. Sweden: P. Olsson. *Amer.* Can. common: Macoun.

23. *F. incurvus* Starke.

Leaves us. as in the last. Capsule us. cernuous often curved. Stem without axillary male flowers. — Earth and stones not r. *Eur.* France: Husnot. *Amer.* Can.: Macoun. U. S.: Langlois, com. Cardot.

* ***F. tamarindifolius*** Don. — *Hypnum* Don; *Fissidens* Bridel.

Leaves short subovate-oblong. Capsule nearly straight. — On earth r. *Eur.* Italy! Sweden: M. Huss. *Amer.* Can.: Macoun.

* ***F. pusillus*** Wilson.

Leaves smaller somewhat long. Capsule straight erect. — Rocks not r. *Eur.* Sweden, Norway, Switzerl.! France: Husnot. *Engl.*: Rogers. *Amer.* Can.: Macoun.

* ***F. minutulus*** Sullivant icon. musc.

Leaves small narrow suboblong or oblong-lanceolate very narrowly limbate; basal lamina often incomplete. Capsule straight erect or inclined. Not much distinct from *F. incurvus*
* *pusillus*. — Moist rocks. *Amer.* Can.: Macoun. *Eur.* »*Engl.*»: Braithwaite.

* ***F. Bambergeri*** Schimper; Husnot muscol. gall.

Leaves somewhat small and not long, often incompletely

limbate. — Sandy soil r. *Eur.* »Austria»: Schimp. syn. *Amer.* »U. S.»: Cardot.

* **F. texanus** Lesquereux.

»Leaves broader; costa sometimes short-excurrent. Capsule short-rostrate. — *Amer.* r. U. S. Texas: Wright»: Lesq. et Jam. 24. **F. algarvicus** Solms Laubach; Husnot m. gall.

Differs from *F. incurvus* **pusillus* in narrower leaves, the upper sublinear more acuminate and broadly limbate; cells sometimes suboval. — Clayey soil r. *Eur.* France: Corbière, com. Husnot.

25. **F. exiguus** Sullivant ic. musc. — *F. falcatus* Renauld et Cardot.

Differs from other species of subg. *Eu-Fissidens* in leaves gen. not limbate at least on lamina. Upper leaves oblong-lanceolate subacute. Capsule suboval-oblong erect. Plant very small. Dioecious. — Earth and stones r. *Eur.* »Engl.»: Braithwaite. *Amer.* Can.: Macoun. U. S.: Sullivant, com. C. Mueller.

* **F. subimmarginatus** Philibert; Husnot muscol. gall.

Leaves with broadly limbate wings. — *Eur.* »France»: Philibert. *Amer.* Can.: Macoun.

c. Leaves gradually acuminate; costa excurrent.

26. **F. Sardagnæ** Venturi revue bryol. 1883.

»Leaves in 3—4 pairs; upper narrowly linear-lanceolate limbate by 2—3 rows of linear cells, rigid when dry; basal lamina incomplete; cells irregular hexagonal larger than in *F. incurvus* **pusillus*. Capsule erect suboval, when dry cylindric; lid unknown. Plant minute. — *Eur.* Sardinia»: Venturi.

76. **Conomitrium** Montagne.

1. **C. Julianum** Savi. — Fontinalis Savi; Conomitrium Mont.

Leaves large long sublinear obtuse entire not limbate, in many pairs; wings short; cells round-hexagonal; costa abbreviate. Capsule small green piriform wide-mouthed; lid longer; teeth approached very short sometimes cleft nearly to middle; pedicel terminal on a small lateral branch, not much longer than capsule; calyptra mitriform. Tufts green very loose. Stem often long. Monoecious but r. fruiting. — In water viz. in fountains. *Eur.* somewhat r. Switzerl. Sweden: Arnell. Germany: Baur. Italy: Arcangeli. *Amer.* r. Can.: Macoun. U. S.: Sullivant, com. C. Mueller.

2. **C. Hallii** Sullivant et Lesquereux; Sull. icon. m.

Differs from the last: Leaves much narrower, setaceous gradually narrowed, in 5—10 pairs; wings shorter; outer basal

cells narrower, short-rectangular in many rows. Capsule oval-oblong on elongate branches, with a not longer lid; pedicel 3—4 times longer; teeth more distant, long subulate not cleft; calyptra short cucullate. Tufts blackish green when dry. Stem about 3 centim. long. — Submerged stones and logs r. *Amer.* U. S.: Leiberg, com. Mrs Britton.

Fam. 20. **Splachnaceæ.**

77. **Splachnum** L.

I. **Umbracularia.** Apophysis open umbraculiform very large. Leaves from round-oval base abruptly long-acuminate.

II. **Ampullaria.** Apophysis inflated not open, very much broader than capsule; pedicel reddish.

III. **Pseudo-Kapledon.** Neck solid, not much broader or sometimes a little narrower than capsule; pedicel yellowish.

I. **Umbracularia** C. Mueller.

1. **S. rubrum** Montin.

Capsule brown; apophysis campanulate purplish red; pedicel red. Leaves us. denticulate all around. — On dung in peat-bogs in northern districts r. *Eur.* Sweden! *Amer.* Can.: Hay, com. Macoun.

2. **S. luteum** Montin.

Capsule pale brown; apophysis yellow campanulate finally plane; pedicel orange. Leaves often nearly entire. — North. distr. r. *Eur.* Sweden! *Amer.* Alaska: Dawson, com. Macoun. »Can.: Drummond»: Macoun.

3. **S. melanocaulon** (Wahlenberg as. var.) Schwægrichen.

Capsule and pedicel brownish; apophysis pale yellow soon becoming plane. — Very r. *Eur.* »Lapland»: Wahlenb. *Amer.* »Can.: Rocky mts»: Macoun and Mitten.

II. **Ampullaria** C. Mueller.

4. **S. ampullaceum** L.

Capsule with piriform reddish yellow finally lilac apophysis; pedicel often very long. Leaves more or less narrow often subulate-acuminate; the upper serrate shorter. Sometimes monoecious. — In humid pasturages less r. *Eur.* Sweden not r.! France: Du Noday. *Amer.* Can.: Macoun; Waghorne. U. S.: Henderson, com. Cardot.

5. **S. vasculosum** L.

Capsule with globose purplish finally blackish red apophysis; pedicel not much long. Leaves broad gen. suboval with broad short obtuse acumen, r. denticulate; the lower broader. —

Peat-bogs in northern alps r. *Eur.* Sweden, Norway! *Scotl.*: Rogers. *Finl.*: Lindberg. *Amer.*: »Can.»: Drummond; C. M. »Sitka»: Lesq. et Jam. »Greenl.»: Berggren.

III. Pseudo-Haplodon Kindb.

6. *S.sphaericum* L. fil. — »*S. pedunculatum* Hudson»: Lindb.

Capsule with reddish yellow finally blackish (globose, ovoid or piriform) neck; pedicel often very long, sometimes very short. Leaves subulate-acuminate gen. oblong sometimes denticulate; the lower very much smaller. — Princ. in northern alps. *Eur.* Norway not r.! Austria: Venturi. *Amer.* Can.: Drummond; Macoun.

78. *Haplodon* (R. Brown, Lindb. as subg.) Kindb. n. genus.

1. *H. Wormskioldii* Hornemann. - *Splachnum* Horn.

Leaves entire from subovate base abruptly acuminate. Capsule small reddish finally blackish, shorter than the small suboval neck and scarcely narrower or sometimes broader when dry; pedicel pale yellow setaceous 1—3 c. m. long. Tufts high dense. — Northern princ. arctic districts (us. on dead lemmings) r. *Eur.* Norway! Spetsbergen: Berggren. *Amer.* Can.: Waghorne. Alaska: J. M. Macoun. Greenl.: Breutel; Berggren.

79. *Tetraplodon* Bruch et Schimper.

A. Leaves long narrow gradually subulate-acuminate us. dentate or denticulate. Pedicel thin not much emerging above the tufts.

1. *T. angustatus* L. fil. — *Splachnum* L. fil.; *Tetraplodon* B. S.

Capsule greenish finally pale brown or yellow, much shorter than neck; pedicel pale setaceous. Leaves gen. denticulate above; costa long-excurrent. Tufts dense often high. — Dung and rotten animals princ. in alps, r. *Eur.* Norway! Sweden: M. Huss. Austria: Husnot M. G. *Amer.* Can.: Macoun; Waghorne.

2. *T. australis* Sullivant et Lesquereux; Sull. ic. m.

Capsule finally brown scarcely shorter, in dry state broader, than neck; pedicel brownish capillary. Leaves very narrow sometimes fimbriate, r. nearly entire; costa gen. percurrent, in uppermost leaves often excurrent. Tufts low less dense. — *Amer.* r. U. S.: Austin, com. Mrs Britton. »Can.»: Lesq. et Jam.

B. Leaves broad entire abruptly narrowed. Pedicel subfiliform somewhat thick and exserted above the very compact tufts.

3. *T. mnioides* L. fil. — *Splachnum* L. fil.; *Tetraplodon* B. S.

Capsule green-yellow or pale red finally red; neck red-rufous much longer; pedicel reddish often long. Leaves suboblong;

costa excurrent. — Dung and rotten animals princ. lemmings. *Eur.* Norway not r.! Sweden: M. Huss. *Amer.* Greenl.: Berggren. Alaska: J. M. Macoun. Can.: Macoun; Waghorne.

4. **T. urceolatus** Bridel. — *Splachnum* Brid.; *Tetraplodon* B. S.

Capsule brownish not shorter than the blackish neck; pedicel yellow about 1 c. m. long. Leaves suboval apiculate; costa not distinctly confluent with the point. — Alp. region r. *Eur.* Austria: Schimper; Breidler. Switzerl.: Muehlenbeck, com. Husnot. *Amer.* Can.: Drummond, com. Macoun.

80. **Dissodon** Greville et Arnott.

A. Leaves distant. Capsule with properistome; pedicel setaceous very long. Spores about 0,08 m. m.

1. **D. splachnoides** Thunberg. — *Weisia* Th.; *Dissodon* Gr. et Arn.

Leaves sublingulate r. denticulate above. Capsule brown roundish finally dilated at mouth, gen. shorter than neck. Tufts sometimes high. — Bogs in alps, r. in lower regions, r. *Eur.* Norway! Sweden: Thedenius. Scotl.: Manchester Cryptog. Soc. *Amer.* Can.: Macoun.

B. Leaves crowded entire. Capsule without properistome; pedicel thickish not long. Spores about 0,04 m. m.

2. **D. Froelichii** Hedwig. — *Splachnum* H.; *Dissodon* G. et A.

Leaves suboblong. Capsule reddish oval not shorter than neck; pedicel about 1,5 c. m. long. — Earth and rocks in alp. regions r. *Eur.* Norway! Switzerl.: Schimper; H. Forssell. *Amer.* Greenl.: Berggren. Can.: Macoun.

3. **D. Hornschuchii** Greville et Arnott.

Leaves suboval. Capsule pale brown suboblong shorter than neck; pedicel about 0,5 c. m. long. Stem very short. — Earth on alp. rocks r. *Eur.* Austria: Breidler, com. Warnstorf. *Amer.* »U. S.»: Lesq. et Jam.

81. **Tayloria** Hooker.

A. Leaves with excurrent costa. Peristomial teeth not cleft. 1. **T. Rudolphi** Hornschuch. — *Eremodon* Hsch.; *Tayloria* Br. eur.

Leaves sublingulate short-acuminate. Capsule yellowish oblong longer than the narrow neck; teeth pale yellow loosely appressed to capsule or erect when dry; lid conic; pedicel thick yellowish. Tufts high. — On trees r. *Eur.* Austria: Schimper; Reuter.

B. Costa of leaves not excurrent.

a. Peristomial teeth entire appressed to capsule when dry.

2. **T. serrata** Hedwig. — *Splachnum* H.; *Tayloria* B. S.

Leaves obovate or suboblong short-acuminate acute. Capsule suboblong yellowish brown not much thicker than neck when

dry; teeth yellowish brown loosely appressed when dry; lid convex; pedicel somewhat thick. — In bogs or on base of trees. *Eur.* not r. in southern alps. Switzerl.! Austria: Schimper. *Amer.* Can.: J. Macoun; Moser. Alaska: J. M. Macoun.

3. **T. tenuis** Dickson. — *Splachnum* Dicks.; *Tayloria* Schimper.

Differs from the last: Capsule shorter, brownish, suboval or finally subglobose and much thicker than neck when dry; teeth blackish brown strongly appressed when dry; pedicel thinner. — Turfy soil princ. in northern distr., r. *Eur.* Norway! Sweden! E. Adlerz; A. Grape. Switzerl.: Schimper. *Amer.* Can.: Macoun; Waghorne.

b. Peristomial teeth soon partite, deflexed or patent, very hygroscopic.

4. **T. splachnoides** Schleicher. — *Hookeria* Schl.; *Tayloria* Hooker.

Leaves oblong or oblong-lanceolate us. short-acuminate. Capsule us. oblong-cylindric; neck much narrower but. us. not longer; columella often long-exserted; teeth dark red; lid us. conic often rostellate; pedicel thin. — Peat-bogs or wet earth on rocks in alps r. — *Eur.* Norway! *Amer.* Can.: Allen, com. Macoun.

* **T. acuminata** (Huebener as var.) Hornschuch.

Leaves long-acuminate. Capsule suboval often shorter than neck; columella not exserted; lid sometimes convex. — Bogs in alps r. *Eur.* Norway! *Amer.* Can.: Macoun; Drummond n. 47; Waghorne in herb. C. M.

82. **Oedipodium** Schwægrichen.

1. **Oe. Griffithii** Dickson. — *Bryum* Dicks.; *Oedipodium* Schw.

Leaves obovate not recurved, often with sinuous borders. Capsule subglobose orange-brown; lid subconvex; columella not exserted; neck 1—2 c. m. long. Stem often with obovate axillary buds — Crevices of rocks and wet peaty soil in alps r. *Eur.* Scotl.: H. Boswell; T. Rogers. Sweden and Norway: E. Nyman. *Amer.* »Greenl.»: Berggren.

Fam. 21. **Dicranaceæ.**

83. **Octoblepharum** Hedwig.

1. **O. albidum** Hedwig.

Leaves patent from short broad base abruptly narrowed to the slightly channelled linear short-acuminate near apex serrate acumen; outer basal cells rhomboidal hyaline, the others somewhat dusky subquadrate. Capsule small oval long-rostrate.

Tufts us. not high. Monoecious. — On trees in tropical districts. *Amer.* U. S.; Florida: Fitzgerald, com. Renault.

84. **Leucobryum** Hampe.

A. Leaves thick entire; marginal cells gen. short-rectangular, the lowest longer.

1. **L. glaucum** L. — *Bryum* L.; *Leucobryum* Schimper.

Leaves from oval-oblong concave or channelled base gradually tapering to a longer sublinear channelled or subconvolute acumen, not appressed when dry, patent when moist. Capsule oblong-cylindric often arcuate, more or less distinctly strumose, sulcate when dry. Plants glaucous green or whitish. Dioecious r. fruiting. — Wet heaths and woods common. *Eur.* Sweden, Switzerl. *Amer.* Can.: Macoun. U. S.: Wetherby.

2. **L. minus** Sullivant; Beschereille.

Differs from the last: Upper leaves very much smaller and shorter with broad-oval base and not longer acumen, appressed when dry with patent points, suberect when moist. Capsule small suboval. Plants whitish. — Princ. on rotten wet logs r. *Amer.* U. S.: Fitzgerald, com. Renault; Langleis and Sawyer, com. Cardot. *Eur.* »Engl.»: Braithwaite.

B. Leaves thin sinuolate; marginal cells long-rectangular.

3. **L. Leanum** Sullivant. — *Campylopus* Sull. ic. m.; *Leucobryum* Kindb.

Leaves from narrowly oblong base tapering to a subulate near apex sinuolate, channelled or convolute acumen, erect-patent. Stem often with head-like shoots; their leaves small oval-oblong or linear. Tufts low glaucous or whitish. Capsules unknown. — Decayed logs r. *Amer.* U. S.: Purpus, com. Cardot.

85. **Distichium** Bruch et Schimper.

1. **D. capillaceum** Swartz. — *Mnium* Sw.; *Distichium* B. S.

Nearly all leaves long-pointed; perichetial also abruptly narrowed. Capsule reddish subcylindric or oblong gen. erect; teeth pale red. Tufts glossy. — Rocks princ. of limestone. *Eur.* nearly common. Sweden, Norway, Switzerl. *Amer.* Can.: Macoun; Waghorne.

2. **D. inclinatum** Ehrhart. — *Swartzia* E.; *Distichium* B. S.

Lower leaves with shorter point; perichetial more gradually acuminate. Capsule suboval finally red-brown, more or less inclined; teeth red. Tufts less or not glossy. — Rocks princ. in alp. and northern districts. *Eur.* not r. Norway, Switzerl. France: Husnot. *Amer.* Can.: Macoun; Waghorne.

86. **Aongstroemia** Bruch et Schimper.

1. **Ao. longipes** Sommerfelt. — *Weisia* Somf.; *Aongstroemia* B. S.

Leaves ovate-oblong entire not recurved, very small, appressed when dry: upper acuminate sheathing; costa not percurrent. Capsule ovoid smooth erect; lid rostellate; teeth red below, yellow above, sometimes not cleft; pedicel about 1 c. m., stem shorter. Tufts loose. Male flowers discoid. Dioecious. — Earth princ. on old roads in alps r. *Eur.* Norway! Sweden below alps: J. Persson. *Amer.* Can.: Macoun.

87. **Trematodon** Michaux.

I. **Eu-Trematodon**. Capsule subcylindric; neck long abruptly narrowed; teeth long with prominent basal tube; pedicel long.

II. **Pseudo-Bruchia**. Capsule round-oval when ripe; neck short gradually narrowed; teeth short broad without prominent tube; pedicel short.

I. **Eu-Trematodon**.

A. Capsule not much shorter than neck. Leaves entire; costa long-excurrent.

1. **T. ambiguus** Hedwig. — *Dicranum* H.; *Trematodon* Hornschuch.

Leaves from ovate or ovate-oblong not truncate base abruptly narrowed to a subulate in upper part by costa filled acumen. Perichetial leaves gradually acuminate; costa more or less excurrent often denticulate at apex. Peristomial teeth red us. cleft. — Wet sand or peat-bogs princ. in northern distr. *Eur.* Sweden not r.; Miss O. Cron. Norway: W. Baur. Germany: Huebner. *Amer.* r. Can.: Macoun; Waghorne.

2. **T. acicularis** Kindb. revue bryol. 1896.

Leaves broadly suboval truncate above, pointed by costa; perichetial nearly similar but larger and longer. Peristomial teeth orange split in middle; basal tube red. — Bogs r. *Amer.* Can. Brit. Col.: Macoun.

B. Capsule with twice longer neck. Leaves often denticulate; costa not or scarcely excurrent.

3. **T. longicollis** Michaux.

Leaves narrow gradually subulate; perichetial nearly similar. Peristomial teeth pale red often entire. — Moist clay or sandy soil. *Eur.* r. Italy: Gendano, com. Husnot (a var. with entire leaves). *Amer.* not r. in southern distr. U. S.: Sullivan, com. C. Mueller.

II. Pseudo-Bruchia Kindb.

4. **T. brevicollis** Hornschuch.

Leaves concave subovate short-acuminate very small, nearly appressed when dry; costa not or scarcely excurrent. Perichetial leaves ovate-oblong more distinctly acuminate. Peristomial teeth red entire or faintly perforate. Stem very short. Tufts small dark green. — Earth and rocks in alp. regions r. *Eur.* Norway! *Amer.* »Greenl.»: Berggren.

88. **Ditrichum** Timm.

A. Leaves sheathing; costa rough at back.

I. **Trichodon**. Dioecious.

B. Leaves not sheathing; costa smooth. Perichetial leaves not (exc. *D. vaginans* and *D. homomallum*) sheathing.

II. **Sælania**. Leaves carinate often covered with a glaucous meal. Monoecious.

III. **Leptotrichum**. Leaves not carinate. Often dioecious.

1. **Xanthopodia**. Pedicel of capsule yellow. Leaves long-subulate; costa long-excurrent. Monoecious or paroecious.

2. **Erythropodia**. Pedicel finally red. Leaves often short-subulate. Dioecious.

I. **Trichodon** Schimper.

1. **D. tenuifolium** Schrader. — *Trichostomum* Schrad.; *Ditrichum* Lindberg; *Trichodon cylindricus* Schimper.

Leaves abruptly narrowed to a long subulate-setaceous denticulate by the long-excurrent costa nearly filied point, curled or patent when dry; cells narrow-rectangular. Capsule smooth narrow-cylindric curved when young; teeth red papillose articulate; pedicel long yellowish or pale red. Tufts low not tomentose. — Wet sand princ. in alps. *Eur.* Norway, Sweden, Switzerl. Austria: Bredler. *Amer.* Can.: Macoun.

2. **D. oblongum** Lindberg. — *Trichodon* Lindb. in K. W. A. Foerhandl. (Roy. Acad. in Stockholm) 1864; *Ditrichum* Kindb.

Leaves abruptly narrowed to the entire or indistinctly denticulate not long acumen, which in upper part is, filled by the short-excurrent costa, not or faintly flexuous; cells short-rectangular at least the upper; pedicel red short; »peristomial teeth pale brown hyaline smooth indistinctly articulate»: Lindb. l. c. Tufts dense but not tomentose, about 3 c. m. high when barren, lower when fertile. — On earth in arctic districts r. *Amer.* Greenl.: Berggren. *Eur.* Spetsbergen; R. Gyllencreutz. — The barren specimens are resembling *Ceratodon purpureus*, but leaves not are revolute; in fertile ones from Spetsbergen few capsules are evolute (but unripe), their lids very short obtuse.

II. *Selania* Lindberg.

3. *D. glaucescens* Hedwig. — *Trichostomum* Hedw.; *Ditrichum* Hampe; *Leptotrichum* Hampe; Schimper; *Selania caesia* Lindb.; *Ditrichum montanum* Leiberg bull. Torr. club 1893.

Leaves sublinear or narrowly ovate-lanceolate acute serrulate above, patent when dry; cells gen. short-rectangular or quadrate; costa percurrent. Capsule oblong-cylindric straight sulcate when dry; teeth purple, remotely nodose above; pedicel yellowish red. Tufts not high. — Earth on rocks princ. in alps not r. *Eur.* Sweden, Norway, Switzerl.! Austria: Venturi. *Amer. Can.*: J. Macoun. Alaska: J. M. Macoun. Greenl.: Vanhoeffen.

III. *Leptotrichum* Hampe; Schimper.

1. *Xanthopodia*.

A. Leaves gradually narrowed from ovate or lanceolate base, denticulate above.

4. *D. pallidum* Schreber. — *Bryum* Schreb.; *Ditrichum* Hampe.

Leaves often denticulate to middle; upper cells long linear; upper basal cells suboblong; costa broad not well-defined. Capsule suboblong; annulus revoluble; lid rostellate; pedicel often very long. Tufts low and glossy. — Rocks and stone-walls gen. r. *Eur.* princ. in southern districts. Switzerl.! Germany: Herpell. France: Husnot. *Amer. Can.*: Macoun. U. S.: Sawyer, com. Cardot.

5. *D. Schimperii* Lesquereux. — *Leptotrichum* Lesq.; Sulliv. icon. muscor.; *Ditrichum* Kindb.

Differs from the last: Leaves longer and nearly entire; costa narrower. Capsule smaller and less sulcate; pedicel less long; teeth indistinctly articulate; peristomial tube orange more distinct; spores much larger. — Wet earth and rocks r. *Amer. Pacif.* distr. Can.: Can.: Macoun. U. S.: Bolander, com. Renault; Howell, com. Cardot.

*** *D. flexifolium*** Renault et Cardot. — *Trichodon* Ren. et C.; *Ditrichum* Kindb.

Leaves less long and more flexuous; upper cells shorter. Tufts green. Capsules unknown. — Sandy soil r. *Amer. U. S.*: Sawyer, com. Cardot.

» *Ditrichum Breidlerii* Limpricht (plant hybrid ?) — Agrees with *D. pallidum* in shape of leaves and in yellow pedicel. Differs from it: Plants scarcely 4 m. m. high, stem 1 m. m. Capsule oval not striate; lid obtuse subpersistent; teeth short small brittle; annulus not distinct; pedicel thick not much exerted above upper leaves. — On wet earth. *Eur.* Austria, in

few specimens together with *Ditrichum pallidum* and *Pleuridium palustre*: Breidler: Limpricht Laubm. Deutschl.

B. Leaves entire abruptly narrowed from ovate base.

6. *D. subulatum* Bruch. — *Leptotrichum* Bruch; *Ditrichum* Lindb.

Leaves otherwise as in *D. pallidum*. Capsule smaller, suboval faintly sulcate; annulus none; pedicel not long. — Clayey places on rocks r. *Eur.* southern districts. France: Philibert. Italy: Bottini; Arcangeli.

2. Erythropodia.

A. Tufts very tomentose, us. high and glossy. Leaves gen. large; alar cells sometimes distinct subquadrate; costa long-excurrent.

7. *D. flexicaule* Schleicher. — *Didymodon* Schl.; *Ditrichum* Hampe.

Leaves long-subulate often denticulate, not appressed; cells irregular gen. narrow: basal shorter often reddish; costa often broad. Capsule brown. R. fruiting. — Rocks and stony ground, common. *Eur.* Sweden, Norway, Switzerl. Austria, fruit.: Venturi. *Amer.* Can.: Drummond; Macoun.

* *D. densum* (Schimper as var.) Kindb.

Leaves shorter and less patent; cells gen. short, upper suboval. Tufts more dense and less glossy. — *Eur.* princ. in northern districts. Sweden common, often fruiting!; M. Huss. *Amer.* Can.: Macoun.

B. Tufts not or sparingly radiculose, us. low and not glossy. Leaves gen. not large; alar cells not distinct.

a. Leaf-cells gen. narrow, rectangular.

aa. Perichetial leaves sheathing. Peristome without basal tube.

8. *D. vaginans* Sullivant. — *Trichostomum* Sull. ic. m.; *Ditrichum* Hampe.

Leaves from ovate base gradually short-subulate or acute, entire or nearly so, appressed when dry, erect when moist; cells narrow; costa percurrent or short-excurrent. Tufts eradiculose not glossy, 1 or r. 2 c. m. high. — Earth and wet rocks r. *Eur.* Norway: Geheeb, com. C. Mueller. Belgium: Gravet. France: Lamy, com. Husnot. *Amer.* Can.: Macoun.

9. *D. homomallum* Hedwig. — *Didymodon* Hedw.; *Ditrichum* Hampe.

Leaves (at least on fruiting stem) long subulate gen. entire, us. patent; cells gen. narrow; costa (at least on leaves of fruit. stem) long-excurrent. Tufts us. low. Sterile shoots often short-subulate with subpercurrent costa. — Sandy ground princ.

in subalp. districts. *Eur.* not r. Sweden, Norway, Germany, Switzerl.! Finl.: Brotherus. *Amer.* r. Can.: Drummond. U. S.: Roell.

* **D. zonatum** Bridel. — *Weisia* Brid.; *Ditrichum* Limpricht.

Leaves acute or short-subulate, appressed when dry, suberect when moist; costa percurrent or short-excurrent. Tufts dense but sparingly radiculose, sometimes 3—4 c. m. high. Capsules unknown. — Rocks in alp. region r. *Eur.* Germany: Limpricht. Austria: Breidler. Sweden: E. Nyman. Norway: Kaurin.

bb. Perichetial leaves not sheathing. Peristome with distinct basal tube.

10. **D. tortile** Gmelin. — *Mnium* Gm.; *Ditrichum* Lindb.

Leaves gen. somewhat long-subulate and not or sparingly denticulate, sometimes slightly recurved, us. not appressed when dry; costa percurrent or short-excurrent. Tufts eradiculose. — Sandy places also in alps. *Eur.* Sweden, Switzerl.! France: Husnot m. gall. *Amer.* Can.: Macoun; Waghorne.

* **D. pusillum** Hedwig. — *Trichostomum* H.; *Ditrichum* Timm.

Stem lower; leaves shorter and less patent; costa scarcely excurrent. — *Eur.* not r. Sweden; M. Huss. France: Husnot m. gall. *Amer.* Can.: Drummond; Macoun.

* **D. nivale** C. Mueller. — *Leptotrichum* C. M.; *Ditrichum* Limpricht.

Leaves appressed when dry, suberect when moist; costa fainter, excurrent in upper leaves. Capsule smaller. — Alp. rocks r. *Eur.* Austria: Berggren, com. Gröenwall.

b. Leaf-cells round-quadrangle. Capsules unknown.

11. **D. elatum** Kindb. n. sp. — *Leptotrichum flexicaule* **brevifolium* Kindb. cat. Can. m.

Leaves small gen. entire, from short base abruptly tapering to the not much longer acute or subulate acumen, appressed when dry, patent when moist; costa percurrent. Tufts loose eradiculose not glossy, to 6 c. m. high. — Alp. rocks r. *Amer.* Can. Rocky mts: Macoun.

12. **D. Macounii** C. M. et Kindb. — *Distichium* C. M. et K. l. c.; *Ditrichum* Kindb

Leaves small sometimes denticulate at apex, from short base abruptly tapering to a longer subulate acumen, faintly appressed when dry; costa percurrent. Tufts dense, radiculose below, 2—3 c. m. high. — Alp. rocks r. *Amer.* Can. Brit. Col.: J. Macoun.

89. **Cynodontium** Schimper.

I. **Eu-Cynodontium.** Capsule striate; teeth long persistent. Leaves carinate much recurved.

II. **Oreoweisia.** Capsule smooth; teeth short brittle. Leaves carinate faintly recurved near base.

III. **Pseudo-Philonotis.** Leaves concave not recurved. Stem julaceous. Capsule unknown.

I. **Eu-Cynodontium.**

A. Leaves strongly mamillate on both sides, broadly acuminate gen. obtusate at apex; alar cells indistinct. Capsule (exc. *C. strumulosum*) not annulate.

a. Capsule costate; teeth papillose. Leaves long large.

1. **C. gracilescens** Schimper syn. — *Oncophorus* Lindb.; Braithwaite brit. mossfl. in part.

Leaves gen. acute, perichetial with long linear acumen. Capsule oval-oblong or finally cylindrical, often inclined or suboblique; pedicel straight. — Rocks princ. in alps r. *Eur.* Sweden, Norway, Switzerland Austria: Venturi. *Amer.* »Greenl.»: Lange Greenl. fl. »U. S.»: Lesq. et Jam.

2. **C. cirratum** Hornschuch. — *Campylopus* Hsch.; Brid.; *Cynodontium* Kindb.; *Oncophorus* Lindb.

Leaves gen. obtuse, inner perichetial short-apiculate. Capsule oval with dark red stripes; pedicel arcuate in younger state when moistened. — Rocks princ. in alps r. *Eur.* Norway! *Amer.* »U. S.»: Lesq. et Jam.

b. Capsule small faintly striate; teeth smooth; pedicel short straight. Leaves small short.

3. **C. schisti** Wahlenberg. — *Weisia* Wng; *Cynodontium* Lindb.

Leaves denticulate gen. acute or short-acuminate, perichetial longer acuminate. Capsule round-oval symmetric; teeth us. not cleft. Habit of *Rhabdoweisia*. — Rocks in northern districts gen. r. *Eur.* Sweden less r., Norway! Finl.: Brotherus. *Amer.* Can.: Waghorne.

4. **C. alpestre** Wahlenberg. — *Dicranum* Wng; *Cynodontium* Lindb.

Leaves denticulate also below middle, very small gen. obtuse; perichetial short-acuminate. Capsule oval symmetric very small; teeth cleft. Tufts very low. — Rocks in northern alps r. *Eur.* Norway! »Sweden»: Wahlenb. *Amer.* »Greenl.»: Vahl»: Lange. 5. **C. strumulosum** C. M. et Kindb. cat. Can. m.

Leaves crenulate above, somewhat longer than in the last: lower gen. acute, upper obtuse; perichetial somewhat long-

acuminate. Capsule oblique subobovate gen. strumose; annulus distinct; teeth cleft. Stem higher than in the last. — Limestone rocks r. *Amer.* Can. Rocky mts: Macoun.

B. Leaves faintly mamilllose and subulate-acuminate; alar cells us. distinct; costa nearly smooth at back. Capsule us. annulate; teeth cleft.

a. Capsule strumose somewhat large.

6.C.strumiferum Ehrhart. — *Dicranum* E.; *Cynodontium* Notaris.

Leaves long denticulate above; perichetial with subulate acumens. Capsule suboblong oblique; teeth papillose reddish or orange; pedicel long. Tufts somewhat high. — On rocks r. on trees, princ. in northern districts. *Eur.* Sweden common, Norway, Switzerl.! »Engl. r.»: Braithwaite. *Amer.* Can.: Macoun; Waghorne.

b. Capsule not strumose gen. not large.

7.C.polycarpum Ehrhart. — *Dicranum* E.; *Cynodontium* Schimper.

Leaves more or less denticulate us. long. Capsule us. finally subcylindric and sulcate, less often oblique; teeth as in the last; pedicel us. not long and often thin. Tufts more or less radiculose. — Rocks not r. *Eur.* Sweden, Norway, Switzerl.! Finl.: Lindberg. *Amer.* Can.: Macoun; Drummond; Waghorne. Greenl.: Vanhoeffen.

* **C.torquescens** Bruch. — *Dicranum* Bruch; *Cynodontium* Limpricht; *Oncophorus polycarpus nigricans* Kindb. Laubm. Schwed. u. Norw.

Leaves less long and often nearly smooth, gen. subobtuse and faintly denticulate. Capsule erect symmetric faintly striate, often small; annulus not revoluble. Tufts often low and blackish below. Habit of *C. Bruntoni*. — Rocks. *Eur.* not r. Sweden, Norway, Switzerl.! Austria: A. Schmidt.

* **C.fallax** Limpricht.

Leaves long acute denticulate also below middle, distinctly mamilllose. Capsule erect symmetric faintly striate; annulus not revoluble. Tufts us. green and somewhat high. — Rocks. *Eur.* Norway! Sweden: E. Jæderholm. *Amer.* r. Can.: Waghorne.

8.C.subalpestre Kindb. cat. Canad. m.

Differs from *C. polycarpum*: Leaves smaller nearly pellucid, reflexed only at one border, gen. smooth and entire. Capsule small not distinctly annulate; pedicel scarcely 1 c. m. long. Stem eradiculose very short. — *Amer.* r. Can.: Drummond n. 103, com. Macoun.

II. *Oreoweisia* Schimper.

A. Leaves long gradually long-subulate, crisped when dry.
9.C.Bruntoni Smith. — *Dicranum* Sm.; *Cynodontium* Br. eur.

Leaves recurved near base, distantly denticulate-sinuolate at acumen; basal cells hyaline not much wider than the others. Capsule suboblong pale brown; annulus persistent. Tufts yellowish green us. subpulvinate. Monoecious. — Rocks. *Eur.* nov. r. Sweden, Switzerl. Corsica: Levier. France: Schimper.

10.C.robustum Venturi. — *Dicranoweisia* Vent. revue bryol. 1882; *Cynodontium* Kindb.

»Doubly or triply larger than the last. Differs in leaves smooth; capsule ovate; tufts 3—4 c. m. high or higher, fuscous below, yellowish above. — *Eur.* Portugal»: Venturi.

B. Leaves short broad: upper crisped, lower nearly spirally twisted about stem (as in *Anoetangium*) when dry.

11.C.serrulatum Funck. — *Weisia* Funck; *Cynodontium* Kindb.

Leaves narrowly ovate-oblong or sublinear, short-acuminate subacute, not or (at one side) faintly recurved, strongly mamilllose, in upper part densely mamilllose-serrulate; upper cells small dusky, the basal pellucid rectangular; costa subpercurrent, serrulate at back. Capsule small suboval rostellate; pedicel short not much exerted above the tufts. Monoecious. — Rocks in alp. region r. *Eur.* Austria: Breidler. *Amer.* »U. S. and Alaska»: Lesq. et Jam.

12.C.obtusatum Kindb. — *Oreoweisia* Kindb. rev. bryol. 1896; *O. serrulata* var. *tenuior* C. M. et Kindb. cat. Can. m.

Leaves obtuse broader and shorter than in the last, subovate not acuminate, strongly recurved below, very mamilllose, densely mamilllose-serrulate above; basal cells mostly short, gen. not pellucid; costa percurrent. Tufts very tomentose to the short green tops. Capsules and flowers unknown. Differs from the resembling *Dichodontium pellucidum* **fagimontanum* in smaller and shorter not sheathing leaves, nearly spirally twisted about stem, not or (the uppermost) r. crisped. Resembles also *Anoetangium*. — Damp rocks r. *Amer.* Can: Macoun.

III. *Pseudo-Philonotis* Kindb.

13.C.boreale Hagen and Limpricht. — *Philonotis fontana* var. *borealis* Hagen; Ph. *borealis* Limpricht; *Cynodontium* Kindb.

Leaves small subovate short-acuminate acute; cells subquadrate (or the basal short-rectangular) larger than in other species and more or less pellucid; costa percurrent serrulate at back. Lower leaves smooth pellucid nearly entire, sometimes

decurrent. Upper leaves densely mamillöse-serrulate nearly all around. Tufts high compact tomentose, green above. — Swamps in higher alp. region r. *Eur.* Norway in Galdhoe 1800 metr. a. s.: I. Hagen.

90. **Dichodontium** Schimper.

A. Leaves obtuse or subacute at apex; perichetial similar but more distinctly sheathing. Male plants in separate tufts; perigonal leaves with percurrent costa.

1. **D. pellucidum** L. — *Bryum* L.; *Dichodontium* Schimp.

Leaves channelled from suboblong base sublinear or sometimes ovate-oblong, undulate and scarcely reflexed, us. nearly crowded; inner basal cells narrow hyaline, the others quadrate; costa percurrent. Capsule oblique inclined; teeth purplish below, orange above; lid rostellate; pedicel long yellowish or pale red. Tufts dark or brown green. Dioecious. Leaves very variable in size. — Wet rocks not uncommon. *Eur.* Norway, Switzerl.! Engl.: Holt. *Amer.* Can.: J. Macoun; Moser; Waghorne. Alaska: J. M. Macoun.

* **D. fagimontanum** (Bridel as var.) Kindb. as subsp.

Leaves small subovate-oblong nearly entire; perichetial longer acuminate. Capsule smaller; pedicel short reddish. — Rocks r. *Eur.* Switzerl.! Engl.: Rogers; Cunliffe. *Amer.* Can.: Macoun; Drummond.

2. **D. flavescens** Dickson. — *Bryum* Dicks.; *Dichodontium* Lindb.

Differs from the last: Leaves longer and more serrate, less mamillöse, distant. Capsule subsymmetric or symmetric, not or faintly inclined; teeth orange. Tufts not or sparingly radi-culose, bright green or green. Very r. fruiting. — Wet often submerged rocks r. *Eur.* Norway fruiting, Germany! Sweden fruit.: P. Olsson. France fruit.: Lamy, com. Husnot. *Amer.* Can. fruit.: J. Macoun. Alaska: J. M. Macoun.

B. Leaves acute at apex; the perichetial much different. Male plants mixed with fertile; perigonal leaves with not percurrent costa.

3. **D. subflavescens** Kindb. in *Hedwigia* 1896 p. 59.

Leaves channelled from suboblong base tapering to an attenuate acumen, serrate often to below middle, long distant nearly smooth; cells and costa as in the last. Capsule symmetric erect; teeth dark purplish; pedicel long pale red. Perichetial leaves narrower than the others, long-acuminate and gen. subulate, in upper part of acumen nearly filled by the percurrent or excurrent costa. Perigonal leaves large long-acuminate.

Leaves of male plants sometimes obtuse. Tufts very tomentose to the green tops, often high. — Wet rocks r. *Amer.* Pacif. distr. Can.: Macoun. U. S.: Roell; Henderson, com. Cardot.

• *Dichodontium olympicum* Renault et Cardot (ined.). Leaves very papillose, minutely denticulate nearly all around; capsule strumose. — U. S. Wash.: Henderson; Cardot in Musci Amer. sept. — Specimens not seen.

91. **Dicranum** Hedwig.

A. Capsule straight (in *D. hyperboreum* faintly oblique) not strumose. Leaves not undulate; cells gen. not porose.

a. Monoecious. Leaves entire us. small. Pedicel of capsule not long. Stem gen. without rhizoids above base.

I. **Arctoa**. Leaves channelled; alar cells us. distinct; costa narrow more or less excurrent. Capsule not large; teeth often spreading when dry; pedicel short-emergent.

II. **Metzleria**. Leaves convolute above; alar cells not well-defined; costa very broad long-excurrent. Capsule small; teeth not spreading; pedicel exserted. Plants small.

b. Dioecious. Leaves sometimes denticulate us. large. Pedicel of capsule long. Stem radiculose also above base.

aa. Leaves with narrow or not very broad costa; alar cells persistent.

III. **Orthodicranum**. Leaves channelled or convolute above; upper cells subquadrate. Pedicel of capsule straight; peristomial teeth cleft. Tufts us. green.

bb. Leaves with very broad long-excurrent costa.

IV. **Paraleucobryum**. Leaves subconvolute above, persistent; alar cells persistent us. brown, the others few short-rectangular; costa thick formed by 3 layers as in *Leucobryum glaucum*, middle layer consisting by small green cells. Pedicel of capsule straight; teeth often partite. Tufts whitish green. Calyptra very long.

V. **Pseudo-Campylopus**. Leaves channelled persistent; alar cells persistent brown, the others numerous rectangular; costa not thick. Pedicel of capsule straight; teeth cleft. Tufts green or brownish.

VI. **Dicranodontium**. Leaves channelled soon deciduous; alar cells fugitive pale, the others numerous rectangular; costa not thick. Pedicel of capsule arcuate; teeth often partite. Tufts green or brownish.

B. Capsule curved or oblique sometimes strumose. Leaves often undulate when dry; cells often porose.

VII. **Eu-Dicranum**. Peristomial teeth cleft. Leaves with narrow or not much broad costa.

a. Monoecious. Stem gen. without rhizoids above base. Leaves not undulate. Capsule often strumose.

1. **Falcatifolia.** Leaves channelled not large, flexuous or falcate; costa us. long-excurrent. Capsule not large. Plants not robust.

2. **Molliformia.** Leaves large convolute above, nearly straight; costa not or slightly excurrent. Capsule large. Plants robust.

b. Dioecious. Stem us. tomentose. Leaves sometimes undulate. Capsule not strumose.

aa. Leaves carinate above.

3. **Carinatifolia.** Leaves gen. broad at base, often undulate; costa subpercurrent.

bb. Leaves channelled at least below, not carinate above.

4. **Scopariiformia.** Leaves not distinctly convolute above, broad at base, not long-subulate, sometimes undulate; costa r. excurrent.

5. **Fuscescentiformia.** Leaves not distinctly convolute, narrow gen. long-subulate, not undulate; costa often excurrent.

6. **Convolutifolia.** Leaves convolute above, not undulate, broad or narrow; costa not r. excurrent.

I. *Arctoa* Bruch et Schimper.

1. **D.fulvellum** Dickson. — *Bryum* Dicks.; *Dicranum* Smith.

Leaves us. flexuous or falcate, sometimes nearly straight; alar cells not well-defined, the others gen. long; costa often denticulate above. Capsule small straight strangulate not or faintly striate; teeth spreading when dry. Tufts us. yellowish. — Rocks in alp. region r. *Eur.* Norway! Spetsbergen: Berggren. Sweden, in Lapland (a var. with green shorter leaves and less emergent capsule: »*D. Anderssonii*» Wichura); E. Nyman. *Amer.* U. S.: Roell.

2. **D.hyperboreum** Gunner.

Leaves flexuous or nearly straight, larger than in the last; alar cells well-defined; uppermost cells short; costa not or indistinctly denticulate. Capsule somewhat oblique sulcate wide-mouthed not constricted, larger than in the last; teeth erect. Tufts blackish or brown when dry. — Fissures of rocks in northern alp. regions r. *Eur.* Norway! »Sweden»: Lindberg. *Amer.* Greenl.: Berggren.

II. *Metzleria* Schimper, as genus.

3. **D.alpinum** Schimper. — *Metzleria* Sch.; *Dicranum* Kindb.

Leaves narrowly ovate-oblong somewhat flexuous; cells rectangular: outer basal narrower; costa smooth. Capsule oblong-oval not sulcate; calyptra long. Tufts pale brown. Resembling a small *D. albicans* or a *Dicranella*. — Rocks in alp. region

r. *Eur.* Austria: Breidler, com. Warnstorf. Norway: Kaalaas, com. E. Nyman.

III. *Orthodicranum* C. Mueller.

A. Leaves brittle and channelled.

a. Leaves not subulate-acuminate; costa long-excurrent.

4. *D. fulvum* Hooker.

Leaves denticulate above, crisped when dry; cells gen. short; costa somewhat broad. Capsule striate. Tufts us. brown-yellow. R. fruiting. — Rocks princ. of sandstone in woods in lower regions. *Eur.* princ. in southern distr. not r. Switzerl.! France: Husnot. Sweden: Berggren. Norway: E. Nyman. *Amer.* not r. Can.: Macoun.

5. *D. viride* Sullivant et Lesquereux. — *Campylopus* Sull. et Lesq.; *Dicranum* Bruch et Sch.; *D. subfulvum* Ren. et Card. ?

Leaves entire or r. near apex denticulate, us. not crisped or sometimes nearly straight; cells short or the lowest long; costa gen. less broad. Tufts us. green. Very r. fruiting. »Capsule not striate»: Schimper. — Us. on trees r. on rocks. *Eur.* r. Switzerl.! France: Husnot. Sweden: P. Larsson. Norway: Bryhn. *Amer.* Can. eastern districts: Macoun; Moser.

6. *D. strictum* Schleicher.

Leaves entire nearly straight; lower (inner) cells long, the uppermost short-rectangular; costa narrow. Capsule not striate. Tufts pale or yellowish green. R. fruit. in Europe. — Trees or decayed trunks. *Eur.* r. Sweden 1852! Austria: Breidler, com. Warnstorf. *Amer.* less r. princ. in Pacif. distr. Can.: J. Macoun (fruit.). Alaska: J. M. Macoun.

b. Leaves long-subulate; costa short-excurrent or percurrent.

7. *D. subulifolium* Kndb. bull. Torr. club XVII.

Leaves entire, flexuous when dry; cells as in the last; costa narrow. Tufts pale green. — Logs in woods r. *Amer.* Can. Vanc. isl.: Macoun.

B. Leaves gen. not brittle, us. crisped when dry; lower cells gen. long; costa narrow.

a. Leaves short-subulate, denticulate to below middle, rough at back, channelled.

8. *D. montanum* Hedwig.

Leaves with not excurrent costa. Tufts very dense us. green often low. — Decayed trunks. *Eur.* common. Sweden, Norway, Switzerl.! *Amer.* r. Can.: Macoun; Waghorne.

b. Leaves long-subulate, nearly entire, not rough at back, us. convolute above.

9. *D. flagellare* Hedwig.

Costa of leaves denticulate at back, not excurrent. Stem often with flagellæ (short brittle branchlets). Tufts us. pale brown sometimes green. — Decayed trunks not r. *Eur.* Norway! Sweden: S. O. Lindberg; R. Hartman; S. Hardin. *Amer.* Can.: Drummond; Macoun; Dearness. U. S.: Roell; Green.

10. *D. Scottii* Turner.

Costa of leaves smooth excurrent. Stem not flagelliferous. Tufts us. brown often high. — Rocks princ. near Atlantic sea r. *Eur.* France: Le Jolis. Scotl.: Cash. Irel.: Holt. Denmark: Jensen.

c. Leaves acute or short-subulate nearly entire, not rough at back. Capsules unknown.

11. *D. miquelonense* Renaud et Cardot.

Leaves short often subconvolute above, appressed when dry, the uppermost gen. obtusate; nearly all cells short; costa narrow, gen. not excurrent. Stem 2—3 c. m. high. — Rocks r. *Amer.* Miquelon isl.: Delamare, com. Cardot.

12. *D. crispatum* (Roell as var., in Hedwigia 1897 p. 42) Kindberg n. sp.

Differs from the last: Leaves not or slightly involute above, crisped or flexuous when dry; lower cells short-rectangular or longer. Stem about 1 c. m. high. — *Amer.* r. U. S. New Jersey: J. Roell.

IV. *Paraleucobryum* Lindberg.

13. *D. albicans* Br. eur. — *D. enerve* Thedenius (older name); *Campylopus Hallii* Lesq. and *C. frigidus* Lesq. ?

Leaves ovate-oblong acute not much shorter than the excurrent part of costa, entire or r. faintly denticulate near apex, straight and appressed or sometimes falcate, rigid but not brittle; alar cells dilated brown nearly reaching to costa. Capsule smooth erect not large. Stem tomentose, high when sterile, low when fruiting; such specimens are resembling *D. alpinum* or a small *Campylopus*. Very r. fruit. — Alp. rocks r. Switzerl. fruiting! Norway! *Amer.* Can. Brit. Col. fruit.: Macoun.

V. *Pseudo-Campylopus* Kindb.

A. Lamina of leaves not or scarcely shorter than the excurrent part of costa; alar cells not reaching to costa. Leaves gen. not rigid; costa gen. not occupying more than the half of lamina at base.

14. *D. longifolium* Ehrhart.

Leaves soft nearly entire or faintly denticulate, gradually

acuminate; excurrent part of costa more or less serrulate. Perichetial leaves subconvolute abruptly apiculate. Capsule somewhat large; pedicel us. long. Tufts sparingly radiculose us. green or brown-green. Not r. fruiting. — Rocks and stumps. *Eur.* common. Sweden etc.! *Amer.* not common. Can.: Macoun; Drummond.

* **D. Sauteri** Schimper.

Leaves gen. entire; costa occupying about $\frac{1}{3}$ of leaf-base, nearly entire; inner basal cells more numerous. Perichetial leaves long-subulate. Tufts dense not sparingly radiculose. — Rocks r. *Eur.* Norway, Switzerl.! Austria: C. E. Kindberg.

* **D. pachytrichum** Kindb. cat. Can. m. (as var.).

Leaves entire brittle; costa occupying about $\frac{1}{4}$ of leaf-base, faintly serrulate above; inner basal cells numerous. Perichetial leaves exserted convolute short-acuminate. Pedicel of capsule about 1 centim. long. Tufts brown when dry; stem wholly tomentose. — Alp. rocks r. *Amer.* Brit. Col. Selkirk mts 1300 metr. a. sea: Macoun.

B. Lamina of leaves much shorter than the excurrent part of costa; alar cells reaching to it. Leaves rigid; costa very broad at base. Tufts us. tomentose.

15. **D. pachyneuron** Molendo. — *Campylopus* M.; *Dicranum* Kindb.

Leaves falcate not brittle; awn subulate serrulate. Capsules unknown. Tufts compact very tomentose. — Alp. rocks r. *Eur.* Switzerl.!

16. **D. serratum** Kindb. (in litt. ad Limpricht 1887).

Leaves brittle more or less curved; awn strongly serrate, its upper part sublinear. Capsule as in *D. longifolium*. Tufts more or less radiculose us. green. — Rocks r. *Eur.* Norway Dovrefjeld etc.! Sweden Dalsland near Rostock!; Uddewalla: P. Larsson. Germany: Roell.

VI. *Dicranodontium* Bruch et Schimper.

17. **D. longirostre** Weber et Mohr. — *Didymodon* W. M.; *Dicranum* Kindb.; *Didymodon denudatus* Lindb.; *Dicranodontium virginicum* Britton.

Stem not brittle. Leaves brittle at base and easily deciduous, gradually tapering to a long-subulate in upper part faintly serrulate acumen, flexuous or falcate; lower cells (above the alar) gradually narrower from costa to border. Tufts us. yellowish or green. Not r. fruiting. — Rocks, earth and decayed trunks. *Eur.* not r. Spain, Switzerl., Sweden! Norway: R. Hartman. Austria: Breidler. *Amer.* r. Can.: Moser.

18. **D. asperulum** Mitten. — *D. virginicum* Austin; *Dicranodon-
tium aristatum* Schimper; *D. Millspaughi* Britton.

Leaves and stem brittle. Leaves narrower than in the last,
less gradually tapering to the also in lower part serrulate acu-
men, less flexuous or nearly straight when dry; lower cells
(above the alar) dilated nearly uniform. Tufts us. pale brown,
very soft and silky-like. Very r. fruiting. — Rocks r. *Eur.*
Austria: A. Schmidt. Norway: Wulfsberg, com. P. Olsson. *Amer.*
U. S.: com. Cardot.

VII. *Eu-Dicranum*.

1. *Falcatiformia*.

A. Capsule sulcate when dry.

19. **D. Starkel** Weber et Mohr. — *Oncophorus suecicus* Arnell
et Jensen.

Leaves flexuous; alar cells well-defined; uppermost cells short,
the others long or short. Capsule sometimes suberect and less
distinctly strumose. Perichetial leaves subovate us. long-aristate.
Tufts us. green. — Rocks princ. in alps not r. *Eur.* Norway,
Spain, Switzerl. Sweden: R. Hartman; Arnell. France: Boulay,
com. Husnot. *Amer.* Can.: Macoun. U. S.: Roell.

B. Capsule not sulcate.

a. Leaves distinctly falcate also when dry.

20. **D. falcatum** Hedwig.

Alar leaf-cells not well-defined; other cells gen. long, the
uppermost short-rectangular. Perichetial leaves subovate often
long-aristate. Tufts often blackish. — Alp. rocks r. *Eur.* Nor-
way, Switzerl. France: Husnot. Scotl.: Rogers. *Amer.* »U. S.»:
Lesq. et Jam.

b. Leaves flexuous not falcate.

21. **D. schisti** Gunner. — *Bryum* Gunn.; *Dicranum* Lindberg;
D. Blyttii Schimper.

Leaves entire; alar leaf-cells well-defined, the others short at
least the uppermost. Capsule distinctly necked or strumose.
Perichetial leaves oblong short-aristate. Tufts us. blackish
below. — Rocks princ. in alps and northern districts. *Eur.*
not r. Sweden (also below alps), Norway! Scotl.: Rogers. Spets-
bergen: Berggren. Portugal: Levier. *Amer.* r. Can.: Macoun.
Greenl.: Berggren.

22. **D. pumilum** Sauter. — *Aongstroemia Sauteri* C. M.

Leaves sometimes slightly denticulate; cells gen. short, the
alar not much distinct; costa sometimes percurrent. Pedicel of
the indistinctly necked capsule short. Perichetial leaves long-

aristate. Tufts blackish about 0,5 c. m. high or lower. Much smaller than the last. — *Eur.* »Austria: Sauter»; C. M. *Amer.* Can. Labrador: Waghorne. U. S.: Roell.

2. Molliformia.

23. *D. molle* Wilson. — *D. arcticum* Schimper.

Leaf-cells long except the well-defined alar. Capsule not sulcate; pedicel often long. Perichetial leaves long-aristate. Tufts dark or yellowish brown. Habit of *D. spadiceum*. R. fruiting. — Wet earth often near rivulets, in higher northern alp. region, r. *Eur.* Norway! Sweden: C. Indebetou. Scotl.: T. Rogers. Spetsbergen: Berggren, com. A. G. Nathorst. *Amer.* Alaska: Palmer; J. M. Macoun. Greenl.: Berggren.

3. Carinatifolia.

A. Costa of leaves strongly serrate at back. Upper leaf-cells often long.

a. Capsules sulcate us. clustered 3—4 together. Leaves decurrent more or less distinctly undulate when dry.

24. *D. undulatum* Ehrhart.

Leaves very distinctly undulate also when moist, strongly serrate above middle, recurved at one side near base, us. long-subulate, often nearly straight and spreading when dry; angular cells diversiform, the alar brown dilated; other cells long and porose; costa with serrate ridges at back. Inner perichetial leaves nerveless. Tufts green. — On ground in woods. *Eur.* gen. common (in Great Britain r.). Sweden, Switzerl. *Amer.* common. Can.: Macoun.

* *D. ontariense* Kindb. n. subsp.

Leaves less spreading, not recurved, strongly serrate only in upper part of acumen. Capsule solitary. — *Amer.* Can. r.: Macoun.

25. *D. Drummondii* C. Mueller.

Leaves tapering to a long sublinear in upper part serrate acumen, not recurved, flexuous or crisped when dry, often indistinctly undulate; cells very chlorophyllose not porose: lower angular yellow, alar uniform dilated us. hyaline, other lower basal long, the others short irregular but the apical often long. Tufts green or yellowish. — Damp woods and peat-bogs. *Amer.* not r. Can.: Macoun; Roell.

b. Capsules solitary r. in pairs. Leaves not decurrent r. undulate.

26. *D. canadense* Kindb. bull. Torr. club XVII.

Leaves narrowed to a long subulate in upper half strongly

serrate acumen, us. nearly straight, often brittle, sometimes convolute below; alar cells dilated yellow, inner basal hyaline narrower, other cells long. Perichetial leaves acuminate costate long-aristate. Capsule sulcate us. solitary. Tufts dark green. — Earth in woods. *Amer.* r. Can.: Macoun; Waghorne. U. S.: Roell.

27. *D. consobrinum* Renauld et Cardot.

Differs from the last: Leaves shorter, perichetial short-aristate often emarginate; capsules smooth often in pairs. — *Amer.* r. U. S.: Henry, com. Cardot.

28. *D. scopariiforme* Kindb. bull. Torr. club XVI.

Leaves broadly acuminate or short-subulate, strongly serrate in upper part of acumen, not brittle, often curved r. undulate; alar cells brown dilated, the others gen. oblong-oval or narrower, r. porose; costa with serrate ridges at back. Inner perichetial leaves nerveless, emarginate or crenulate above. Capsule smooth. Tufts green. — *Amer.* r. Can. Rocky mts: Macoun. U. S. Michigan: Purpus, com. Roell.

29. *D. campophyllum* Kindb. n. sp.

Leaves tapering to a long subulate in upper half strongly serrate acumen, falcate and not crisped when dry; cells not porose: those of acumen subquadrate, the alar yellow dilated subrectangular reaching to costa; other basal cells long. Perichetial leaves obtusate or abruptly tapering to a gen. longer, narrow-subulate or subfiliform awn with long-excurrent costa. Capsule solitary not sulcate. Tufts green above. — *Amer.* r. Can. Northern Labrador: Macoun 1896.

B. Costa of leaves faintly rough at back. Upper leaf-cells gen. short. Capsule solitary sulcate.

a. Leaves not brittle, gen. broad at base; angular cells diversiform: alar dilated brown persistent, inner basal narrow. Capsule long-pedicellate.

30. *D. Bergeri* Blandow. — *D. Schraderi* Weber et Mohr.

Leaves us. tapering to a long broadly sublinear in upper part serrulate often obtuse acumen, often undulate and flexuous; upper cells short; costa not percurrent. Perichetial leaves often emarginate and short-aristate. Tufts us. brown-green. — Peat-bogs and swamps gen. common. *Eur.* Sweden, Norway! *Amer.* Can.: Macoun. Greenl.: Vanhoeffen.

*** *D. rapincola*** Kindb. n. subsp.

Leaves subulate-acuminate; costa percurrent, serrulate at back.

Perichetial leaves long-aristate not emarginate. — Rocks r. *Amer.* Can. Rocky mts: Macoun.

* ***D. rigidum*** Kindb. Laubm. Schwed. u. Norw.

Leaves acute short-acuminate rigid not undulate, nearly appressed when dry; costa subpercurrent. Tufts nearly eradiclese, pale or whitish green when dry. Capsules unknown. — In bogs r. *Eur.* Sweden near Strömstad: P. Olsson.

31. ***D. pallidum*** Bruch et Schimper. — *D. sabuletorum* Renault et Cardot.

Differs from *D. Bergeri*: Leaves gradually acuminate acute short-subulate, often crisped when dry; cells sometimes suboblong; costa percurrent or subexcurrent. — Sandy soil r. *Amer.* Can.: Waghorne. U. S.: Sull. et Lesq. exsicc., com. Cardot; Sawyer and Green, com. Cardot.

b. Leaves brittle and narrow; angular cells uniform dilated fugitive faintly yellowish; other basal cells long hyaline. Capsule short-pedicellate.

32. ***D. leucobasis*** C. M. et Kindb. l. c.

Leaves tapering to a very long narrow nearly wholly spinulose-serrulate acute acumen, faintly undulate and crisped when dry; middle cells of lamina gen. short. Capsule not large. Resembles somewhat *D. fuscescens* in habit. — Base of trees in woods r. *Amer.* Pacif. distr. Can. Brit. Col.: Macoun. U. S.: Roell.

4. Scopariiformia.

A. Leaves rough or denticulate at back of lamina, us. crisped and often undulate when dry; costa sometimes excurrent. 33. ***D. elatum*** Lindberg. — *D. robustum* Blytt (the inventor).

Leaves long, tapering to a long spinulose-serrulate brittle acumen, dentate at back; acumen with narrow-subulate often circinnate point; cells of angles diversiform, the inner narrow; other cells of lower part long, the upper short irregular; costa very rough at back near apex, often excurrent. Capsules clustered 3—4 not striate when wholly ripe. Plants yellowish green very robust us. high. — Bogs and humid woods r. *Eur.* Norway! Sweden!; Lindberg.

34. ***D. spurium*** Hedwig.

Leaves gen. not long, ovate-lanceolate acute or from subovate base abruptly acuminate, subpapillose at back, very faintly serrate at the us. short acumen; cells as in the last; costa abbreviate or subpercurrent, faintly rough at back. Capsule solitary striate. Tufts yellowish green not high. — Dry heat's

and woods on sandy soil, r. on rocks. *Eur.* not r., common in northern distr. Sweden, Norway, Switzerl. *Amer.* Can. not r.: Macoun; Waghorne.

B. Leaves smooth at back of lamina, not crisped; costa not excurrent.

a. Leaves not undulate gen. short.

35. **D. brachycaulon** Kindb. cat. Can. m. — *D. plano-alare* C. M. et Kindb. l. c.

Leaves ovate-oblong or broadly ovate-lanceolate acute, entire or near apex indistinctly denticulate, sometimes nearly appressed when dry, smaller than in the last; cells gen. short also near base; costa smooth at back. Tufts low green. — Dry rocks or earth r. *Amer.* Can.: Macoun; Waghorne.

36. **D. stenodictyon** Kindb. bull. Torr. club XVI. — *Monocranum* Kindb. cat. Canad. m.

Leaves narrowed below, from oblong base short-acuminate obtuse, very short, crenulate (not serrate) above middle, appressed when dry; cells thick-walled not porose; the outer alar brown, the inner hyaline; other cells lanceolate or the upper oblong, the apical sometimes oval; costa very narrow, serrulate above at back. Capsules unknown. Tufts blackish when dry with straw-yellow tops, nearly eradulose. Habit of *Calliergon sarmetosum*. — Earth in woods r. *Amer.* Can. Brit. Col.: Macoun. — In the resembling *Monocranum dicranoides* C. M. (from Chile, com. C. M.) leaves are long-acuminate, peristomial teeth entire, not cleft.

b. Leaves long gen. broadly acuminate or short-subulate, sometimes undulate.

aa. Leaves distinctly decurrent; cells not porose, those of decurrent part narrow; costa smooth at back. Tufts nearly without rhizoids. Capsules unknown.

37. **D. leioneuron** Kindb. bull. Torr. club XVI.

Leaves gen. quite entire, sometimes subobtuse at apex, convolute in middle, suberect when dry, not undulate; angular cells diversiform, the inner pellucid sometimes pale yellow; other cells long narrow; costa very narrow. Tufts yellowish. — Swampy woods r. *Amer.* Can. Anticosti: Macoun.

bb. Leaves gen. not distinctly decurrent; cells us. porose; costa more or less denticulate at back. Inner perichetial leaves longer than the awn. Pedicels long solitary or r. in pairs. Tufts radiculose.

38. **D. scoparium** L. — *Bryum* L.; *Dicranum* Hedwig.

Leaves faintly serrulate in upper part of acumen, more or less curved and patent but not spreading when dry, r. undulate; angular cells diversiform, the alar brown more dilated, the inner pale yellow or less often hyaline; other cells gen. long, the uppermost sometimes suboblong; costa us. with 2 serrate ridges at back near apex. Perichetial leaves not long-aristate. Capsule not sulcate. Tufts us. green, sometimes blackish. — Dry places common, less often in bogs and somewhat r. in alp. regions *Eur.* Sweden, Norway, Switzerl. *Amer.* Alaska: J. M. Macoun. Can.: J. Macoun; Waghorne. U. S.: Sullivant, com. C. Mueller; Roell.

* **D. involutum** Kindb. n. subsp.

Leaves falcate not or sparingly porose, very concave, subconvolute in middle, very chlorophyllose, sometimes undulate; cells gen. oblong-oval. Capsules unknown. — *Amer.* r. Can. Vanc. isl.: Macoun. U. S.: Roell.

39. **D. Bonjeani** Notaris. — *D. palustre* Br. eur.

Leaves nearly entire, spreading and undulate when dry, often nearly straight; cells as in *D. scoparium*; costa nearly smooth without ridges at back, us. not percurrent. Perichetial leaves short-aristate. Capsule sulcate. Tufts us. yellowish. — Bogs. *Eur.* not common. Sweden (common), Norway! *Amer.* r. Can.: Macoun.

40. **D. undulifolium** C. M. et Kindb. l. c.

Leaves nearly entire, often obtuse at apex, nearly appressed and slightly undulate when dry; cells as in the last; costa not lamellate but denticulate at back near apex. Tufts golden glossy, sparingly radiculose. Capsules unknown. — In alps r. *Amer.* Can. Rocky mts 2500 metr. a. s.: Macoun; Vanc. isl.: Roell. U. S.: Roell.

41. **D. angustum** Lindberg; Kindb. rev. bryol. 1896.

Leaves entire not undulate, narrower and less spreading than in *D. Bonjeani*, often nearly straight and suberect; cells as in the same species but gen. not porose; costa percurrent, nearly smooth without ridges at back. Capsule sulcate. Tufts yellowish green. — Bogs r. *Eur.* northern districts. Norway! Finl.: Brotherus. Sweden princ. in Lapland: E. Nyman.

42. **D. Roellii** Kindb. in Hedwigia 1896 p. 60. — *D. Bonjeani* var. Roellii Barnes.

Differs from *D. Bonjeani* in leaves neither spreading nor undulate and their costa sometimes bilamellate. — More allied to *D. scoparium*; differs from it in leaves faintly crenulate at

acumen, their upper cells suboblong, less porose; costa more abbreviate, nearly smooth at back. — *Amer.* Pacif. distr. r. Can. Vanc. isl.: J. Roell.

Var. *Schlotthaueri* Barnes.

Leaves shorter, broader-acuminate, their upper cells gen. sub-oval, costa not bilamellate. Habit of *D. brachycaulon*. — *Amer.* r. U. S. Yellowstone Park 2100 metr. a. s.: Roell.

43. *D. subpalustre* C. M. et Kindb. l. c.

Leaves serrulate in the greater part of the somewhat long narrow (sometimes brittle) acumen, very concave below, subconvolute at base of acumen, sometimes short-decurrent, not spreading, sometimes undulate when dry; cells as in *D. scoparium*; costa percurrent, serrulate in upper part but not lamellate. Perichetial leaves long-aristate. Capsule nearly smooth or finally sulcate. Tufts often yellowish. — Bogs r. *Amer.* Can.: J. and J. M. Macoun. U. S.: Roell. *Eur.* Sweden in Lapland: E. Nyman.

44. *D. hyalinum* Kindb. in Hedwigia 1896, p. 61.

Leaves faintly denticulate near apex, narrower and somewhat long-acuminate; alar cells nearly hyaline rectangular not well-defined; other cells hyaline not porose, narrow-linear except the oval apical; costa faintly denticulate near apex, narrow above but very dilated at base, not excurrent. Tufts loose very sparingly radiculose. Capsules unknown. — Alp. region r. *Amer.* U. S. Nat. Park 2100 metr. a. s.: Roell.

5. *Fuscescentiformia*.

A. Inner perichetial leaves longer than the awn.

a. Leaves very long and not crisped but falcate or nearly straight when dry, sometimes brittle; costa very narrow. Capsule large; pedicel very long. Tufts shining very high.

45. *D. majus* Smith.

Leaves with subulate nearly wholly serrulate acumen; angular cells diversiform, the inner hyaline; other cells long uniform porose; costa excurrent rough at least in upper half. Capsules faintly striate us. clustered. Inner perichetial leaves denticulate, truncate below the awn. Tufts green or yellowish. — On earth and shaded rocks in woods. *Eur.* not r. Sweden common! *Amer.* r. Can. eastern districts: J. Macoun. U. S.: Roell. Alaska: J. M. Macoun.

46. *D. Howellii* Renauld et Cardot bot. gaz. 1889. — *D. angustifolium* Kindb. bull. Torr. club XVII, 1890 (in part).

Leaves with sublinear in upper half serrulate acumen, narrower

than in the last; cells as in the last; costa not distinctly excurrent and nearly smooth. Capsule sulcate solitary. Inner perichetial entire, attenuate to awn. Tufts us. golden glossy. — Damp rocks. *Amer.* Pacif. dist. not r. Alaska: J. M. Macoun. Can.: J. Macoun; Dawson. U. S. Oregon: Hertzman; Roell; Howell, com. Cardot.

* ***D. angustifolium*** Kindb. l. c. in part.

Capsule not sulcate. Leaves nearly entire. — Damp rocks r. *Amer.* Can. Vanc. isl.: Macoun.

b. Leaves less long and not brittle, us. flexuous or crisped when dry; costa sometimes somewhat broad. Capsule solitary gen. less large; pedicel not much long. Tufts us. low and not shining.

47. ***D. fuscescens*** Turner.

Leaves with subulate in upper part more or less serrulate acumen, flexuous or crisped; cells u.s. not porose; angular cells diversiform, the inner hyaline; other cells of base long, the upper gen. short; costa faintly rough at back, us. excurrent and somewhat broad. Capsule us. oblique striate or sulcate. Tufts us. grayish green when dry. — Decayed trunks or damp rocks in woods not r. *Eur.* Sweden, Norway! *Amer.* Can.: Macoun. U. S.: Roell.

* ***D. congestum*** Bridel.

Leaves less serrulate with sublinear acumen; cells us. porose; costa us. subpercurrent narrower. Capsule less striate. Tufts us. green. — Not r. *Eur.* Sweden, Norway, Switzerl.! Finl.: Brotherus. *Amer.* Can.: Macoun; Waghorne. U. S.: Roell.

* ***D. Sendtneri*** Limpricht.

Leaves nearly entire less flexuous, sometimes subconvolute; cells porose, upper gen. narrow. Capsule nearly straight. — Rocks r. *Eur.* Norway! Russia: Zickendrath.

* ***D. subbrevifolium*** Kindb. n. subsp.

Leaves larger, subconvolute nearly entire; costa not excurrent. Capsule sulcate. Stem somewhat high. Habit of *D. brevifolium*. *Amer.* r. Can. Rocky mts: Macoun.

48. ***D. congestiforme*** C. M. et Kindb. l. c.

Leaves with somewhat broad short-subulate nearly wholly serrulate acumen, faintly flexuous, larger than in *D. fuscescens*; upper and middle cells porose gen. narrow, the others as in the mentioned species; costa distinctly rough at back, not excurrent, narrow. Capsule oblique somewhat large and finally

sulcate. Tufts greenish and high. — Damp subalp. rocks r. *Amer.* Can. Brit. Col.: Macoun.

49. *D. algidum* Kindb. *revue bryol.* 1896.

Leaves entire nearly straight and suberect, only the upper flexuous, narrower than in *D. fuscescens*; angular cells nearly uniform dilated; other cells very porose, gen. long; costa very narrow, nearly smooth at back or slightly rough in the excurrent part. Tufts soft and silky, green or dark green, nearly eradiculose. Capsules unknown. Habit of *D. spadiceum*; differs from it princ. in not convolute leaves. — Rocks in alps r. *Amer.* Can. Rocky mts 2700 metr. a. s.: Macoun. *Eur.* Sweden in Lapland, and Norway: E. Nyman.

* ***D. subspadiceum*** Kindb. n. subsp.

Leaves straight erect subconvolute, denticulate near apex and at the excurrent part of costa. Tufts brown with yellowish branch-tops. Capsules unknown. — Rocks in alp. region r. *Amer.* Can. Rocky mts 2500 metr. a. s.: Macoun.

B. Perichetial leaves shorter than the awn.

50. *D. sulcatum* Kindb. *bull. Torr. club XVII*; *D. trachyphyllum* Ren. et Card.

Leaves brittle not large, more or less flexuous when dry; cells porose, the uppermost short, the lower long; costa broader than in *D. fuscescens*, sometimes excurrent. Capsule sulcate. Habit of *D. fuscescens*. — Logs and rocks r. *Amer.* Can. Brit. Col.: J. and J. M. Macoun. N. Foundl.: Waghorne.

51. *D. crispulum* C. M. et Kindb. *cat. Canad. m.*

Differs from the last: Leaves narrower, more crisped when dry; cells not porose, the uppermost irregular sometimes sub-oblong; costa very narrow gen. percurrent. — On earth or trees in woods r. *Amer.* Pacif. distr. Can. Brit. Col.: J. Macoun. Alaska: J. M. Macoun. U. S.: Roell.

52. *D. perichaetiale* Kindb. in *Hedwigia* 1896 p. 61.

Differs from the both last in the leaves larger and broader, neither crisped nor flexuous, only the uppermost subfalcate, less often brittle; cells larger, narrow-linear, not or sparingly porose; costa distinctly denticulate at back, not excurrent, narrower than in *D. sulcatum*; capsule larger. Resembles *D. scoparium* and *D. majus* in habit. — *Amer.* Pacif. distr. r. U. S.: Roell.

6. *Convolutifolia*.

A. Leaves serrulate in upper part of acumen.

a. Leaves long-subulate; costa somewhat long-excurrent. Tufts tomentose; tomentum often reddish.

53. *D. Muehlenbeckii* Bryol. eur.

Leaves flexuous; cells gen. not porose, the angular dilated nearly uniform, the inner pale yellow; other cells of lower part gen. narrow, the middle and upper short mixed with some long near apex; costa faintly rough at back. Capsule often nearly smooth. Often more robust and high than in the resembling *D. fuscescens*. — Rocks princ. in alp. or northern districts, not common. *Eur.* Norway, Switzerl. France: Husnot. Germany: Kolb, com. Warnstorf. *Amer. Can.*: Macoun. U. S.: Roell.

b. Leaves not long-subulate; costa gen. percurrent. Tufts sparingly radiculose.

54. *D. rhabdocarpum* Sullivant.

Leaves patent-erect not flexuous; angular cells diversiform, the alar pale yellow; other cells gen. long; costa rough at back without ridges. Capsule sulcate. Habit of *D. scoparium*. — Subalp. woods r. *Amer.* Rocky mts: Lesq. et Sulliv. exsicc., com. Renauld. *Eur.* Sweden in Lapland: E. Nyman.

55. *D. dipteroneuron* C. Mueller in Flora 1887.

Leaves flexuous somewhat small; alar cells brown, the others narrow or the uppermost oval; costa with 2 serrulate ridges at back, sometimes short-excurrent. Capsule smooth not large; pedicel short. Habit of *D. brevifolium*. — *Amer.* r. Greenl.: C. Wensk, com. Roell. U. S.: Roell. »Alaska: Krause»: C. M.

B. Leaves gen. entire, r. indistinctly denticulate near apex. Capsule sulcate.

a. Leaves somewhat large; costa gen. percurrent. Tufts not densely radiculose. R. fruiting.

56. *D. brevifolium* Lindberg.

Leaves flexuous short-subulate, sometimes less distinctly convolute; angular cells dilated nearly uniform, outer brown, inner pale yellow; other cells gen. short; costa nearly smooth at back. Sometimes more robust and high than in the resembling *D. fuscescens*. — Rocks princ. in alp. or northern districts, r. *Eur.* Sweden, Norway! Finl.: Brotherus. *Amer. Can.*: Macoun.

57. *D. spadiceum* Zetterstedt. — *D. neglectum* Juratzka.

Leaves open-erect not flexuous, somewhat long-subulate; angular cells diversiform, the inner hyaline sometimes reaching to costa; other cells gen. long nearly uniform; costa smooth sometimes short-excurrent. Tufts often brown. Habit of *D. molle* and *D. scoparium*. — Rocks in alp. regions r. *Eur.* Norway,

Switzerl. France: J. E. Zetterstedt. Spetsbergen: Berggren.
Amer. Greenl.: Berggren.

b. Leaves small; costa excurrent smooth at back. Tufts dense tomentose. Capsule not large.

58. *D. elongatum* Schleicher.

Leaves us. from somewhat broad base short-subulate and entire, nearly all appressed when dry; angular cells diversiform, the alar brown; other cells narrow except the gen. short upper; costa somewhat broad and not long-excurrent. Capsule faintly curved. Tufts green or brownish us. very high. — Swamps and wet rocks princ. in alps. *Eur.* nearly common in northern alps. Sweden, Norway! *Amer. Can.:* Drummond; Macoun; Waghorne. *Greenl.:* Wensk, com. Roell.

* *D. dovrense* Kindb. n. subsp.

Leaves narrower with longer subula, entire and not brittle, nearly all appressed when dry; nearly all cells narrow except the alar; costa longer-excurrent. Capsule faintly curved. — *Eur.* Norway in Dovrefjeld!

* *D. subfragilifolium* Kindb. n. subsp.

Leaves narrow long-subulate faintly denticulate above, flexuous, sometimes brittle; costa long-excurrent narrower. Capsule arcuate. — Northern alps r. *Eur.* Norway near Kongswold! *Amer. Can.:* Waghorne.

* *D. attenuatum* Kindb. n. subsp.

Leaves larger, gradually tapering to a somewhat long subula, nearly entire and often brittle, the uppermost flexuous; costa short-excurrent. Capsule more or less curved. Habit of *D. fragilifolium*. Tufts low. — *Amer. Can.* Labrador; Waghorne.
59. *D. fragilifolium* Lindberg. — *D. Macounii* Austin in herb. Macoun.

Leaves from narrow base very long-subulate, entire and brittle, gen. straight erect or the uppermost flexuous; alar cells r. well-defined, the others gen. rectangular or some few short; costa narrow very long-excurrent. Capsule oblique us. arcuate, larger than in *D. elongatum*. Tufts low us. green or pale brown. Habit of *D. strictum*. — On logs in northern princ. subalp. districts r. *Eur.* Norway! Sweden: S. O. Lindberg; E. Nyman. *Amer. Can.:* Drummond; Macoun; Waghorne.

c. Leaves small entire; costa percurrent smooth at back. Tufts densely radiculose. Capsule small. Habit of *D. elongatum*.
60. *D. groenlandicum* Bridel. — *D. labradoricum* C. M.; *D. tenuinerve* Zetterstedt.

Leaves abruptly narrowed to the scarcely longer acumen, gen. broader than in *D. elongatum*, strongly appressed when dry; angular cells us. not well-defined, other cells gen. long or the uppermost shorter; costa very narrow. Capsule curved. Tufts high pale brown very compact. R. fruiting. — Swamps and wet rocks in arctic or other northern alps r. *Eur.* Norway! Spetsbergen: Berggren; R. Gyllencreutz. Russia near Kola: Brotherus, com. C. Mueller. *Amer.* U. S. Miquelon isl.: Delamare, com. Cardot. 61. **D.Sphagni** Wahlenberg fl. lappon.

Leaves as in the last but somewhat larger, more gradually narrowed, looser appressed or subflexuous; cells as in the last but the angular more distinct and brown; costa less narrow. Capsule straight or slightly curved. Tufts somewhat low, not very compact, often green. — Swamps r. *Eur.* Norway! *Amer.* Can.: Waghorne.

92. **Campylopus** Bridel.

I. **Thysanomitrium**. Leaves often falcate; alar cells short dilated, separated from leaf-borders by narrow (marginal) cells; other cells rectangular; costa long-excurrent somewhat narrow.

II. **Anotis**. Leaves not falcate; alar cells gen. wanting (or indistinctly evolute), the angular narrow gen. not much defined from the other basal ones; upper cells short irregular; costa very broad but often short-excurrent.

III. **Eu-Campylopus**. Leaves sometimes falcate; alar cells short dilated well-defined; other cells short gen. irregular; costa sometimes (in *C. flexuosus*) not or scarcely excurrent. Leaves involute above.

I. **Thysanomitrium** Schwægrichen.

1. **C.uncinatus** Harvey. — *Thysanomitrium* Harv.; *Campylopus* Kindb. Laubm. S. u. N.; *Dicranodontium circinnatum* Schimper.

Leaves from half-sheathing base abruptly tapering to a much longer, subulate acumen, faintly serrulate, patent; alar cells hyaline fugitive. Tufts green loose. Very r. fruiting. — Shaded rocks princ. in alps r. *Eur.* Switzerl. Norway: E Nyman. Scotland: Fergusson. Austria: Breidler.

II. **Anotis** Kindberg.

A. Leaf-base whitish glossy. Leaves and branchlets brittle. Leaves appressed when dry.

2. **C.fragilis** Dickson. — *Bryum* Dicks.; *Campylopus* Br. eur.

Leaves not involute above; upper cells gen. rhombic; costa gen. long-excurrent, sulcate at back, faintly denticulate at apex. Tufts tomentose not high. R. fruiting. — Rocks, esp. of sandstone, and turfy soil. *Eur.* not r. Switzerl.!

B. Leaf-base more or less dusky. Leaves and branchlets r. brittle. Leaves gen. (exc. *C. Schimperi*) not appressed.

a. Leaves not involute above; costa long-excurrent. Not r. fruiting.
3.C.piriformis Schultz. — Dieranum Schz.; Campylopus Bridel;
C. turfaceus Br. eur.

Upper leaf-cells subrhomboidal; costa sometimes sulcate. Stem short, radiculose at base. — Heaths and moorlands. *Eur.* not r. Sweden: Aokerman, com. Lindberg. England: Holt. France: Du Noday.

b. Leaves involute above; costa gen. less long-excurrent. Very r. fruiting.

4.C.subulatus Schimper. — *C. brevifolius* Br. eur.

Upper leaf-cells gen. rhombic-quadrate, the alar sometimes nearly distinct; costa faintly sulcate, sometimes hyaline at apex. Tufts very low without rhizoids. — On stones r. *Eur.* princ. in warmer districts. Switzerl. Belgium: Gravet. France: Berthoumieu. Austria: Breidler. Sweden: P. Larsson.

5.C.Heinrici Renaud et Cardot.

Differs from the last: »Leaves brittle; upper cells longer rectangular; costa longer excurrent, not sulcate»: Ren. et Card. — *Amer.* r. »U. S.»: R. et C.

6.C.Schimperi Milde. — *Leptotrichum tomentosum* Kindb. note on Can. Bryol.

Leaves us. appressed when dry; upper cells oval-rhomboidal; costa not sulcate. Tufts tomentose often very low, sometimes high. — Damp rocks princ. in alps r. *Eur.* Switzerl., Norway! Austria: Breidler. Engl.: Holt. *Amer.* Alaska: J. M. Macoun.

III. Eu Campylopus.

A. Leaves somewhat short, distinctly denticulate above at lamina, flexuous when dry; costa long-excurrent gen. without hyaline hairpoint. Capsules unknown.

7.C.Donnellii Austin. — Dieranum Aust.; Campylopus Lq. et Jam.

Leaves abruptly attenuate, indistinctly auricled, not large; upper cells oval-rhombic; costa not sulcate. Tufts greenish tomentose not high. — *Amer.* U. S., Florida: Austin, com. Cardot.

8.C.subleucogaster C. M. — Dieranum (Campylopus) C. M.

»Differs from the last in its dirty yellow color, leaves less open and less abruptly narrowed, costa broader; terminal branchlets bristle» Lesq. et Jam. — »Leaves distinctly auricled; upper cells quadrate; costa serrulate at apex. Tufts loose, about 3 c. m. high. Stem with very short, densely crowded branches at apex. — *Amer.* r. U. S., Alabama: Mohr»; C. M. in Flora 1875.

B. Leaves long gen. entire or (in *C. Mildei* and *C. setifolius*) denticulate above, us. appressed when dry; costa long-excurrent.

a. Upper leaves us. with long whitish hairpoint.

9.C.introflexus Hedwig. — *Dicranum* H.; *Campylopus* Brid.; *C. polytrichoides* Notaris; *C. leucotrichus* Sull. icon. m.

Leaves straight rigid not distinctly auricled, us. appressed when dry; basal lamina not involute; upper cells rhomboidal-oblong or often curved; costa very broad, deeply sulcate. Male plants with short reddish perigonal leaves. Tufts radiculose us. green or yellowish, sometimes blackish. Very r. fruiting. — Dry heaths and rocks. *Eur.* Switzerl.! *Amer.* »U. S.«: Sulliv.

10.C.brevipilus Br. eur.

Differs from the last: Leaves less rigid, sometimes faintly flexuous; basal lamina partly involute; costa not deeply sulcate, less broad; hairpoint short sometimes wanting. Tufts nearly eradiculose us. yellowish. Capsules unknown. — Moist heaths r. *Eur.* France: Renauld, com. Husnot.

11.C.atrovirens Notaris.

Leaves not rigid, sometimes flexuous or falcate, us. auricled; upper cells gen. oblong or vermicular; costa not deeply sulcate, not very broad. Tufts sparingly radiculose us. blackish or dark green. Very r. fruiting. — Wet rocks and peaty ground. *Eur.* Switzerl.! Norway: R. Hartman. France: Husnot.

* **C.adustus** Notaris.

Leaves nearly straight, less distinctly auricled; upper cells often rhomboidal. Tufts blackish brown when dry. Capsules unknown. — Dry rocks r. *Eur.* Switzerl. in higher subalp. region near Faidol

12.C.gracilicaulis Mitten.

Differs from *C. atrovirens* in not auricled leaves; upper cells often rhombic. »Capsule immersed in the comal leaves»: Lesq. et Jam. *Amer.* r. U. S., Florida: Austin, com. Cardot.

* **C.angustiretis** Austin. — *Dicranum* Austin; *Campylopus* Lesq. et Jam.

»Leaf-cells much longer, sublinear, the alar dirty red. *Amer.* U. S., Florida»: Lesq. et Jam.

b. Leaves without distinct (hyaline) hairpoint, sometimes (exc. *C. Mildei*) falcate or r. (in *C. setifolius*) flexuous.

13.C.Mildei Limpricht.

Leaves nearly appressed when dry, straight, less rigid than in *C. introflexus*, sometimes denticulate above; auricles gen. not much distinct; upper cells oval-rhombic; costa not much deeply

sulcate. Stem more or less radiculose, often very long. Tufts gen. green above, brown below. Capsules unknown. — Dry and moist rocks r. *Eur.* Switzerl. near Luganol

14.C.Shawii Wilson.

Leaves not rigid, abruptly attenuate, entire; auricles indistinct; upper cells oval-rhombic; costa not sulcate, nearly entire. Tufts tomentose green. Capsules unknown. Habit of *Dicranum al-bicans*. — Bogs r. *Eur.* Scotl.: Shaw, com. Bottini.

15.C.setifolius Wilson.

Leaves not rigid, denticulate above; auricles large; upper cells rhombic; costa not sulcate, very rough in upper part. Capsules clustered; calyptra unknown. Tufts nearly eradiculose, blackish or dark green; stem very long. Very r. fruiting. — Rocks r. *Eur.* Irel.: G. A. Holt.

16.C.Schwarzii Schimper.

Leaves not rigid, entire, r. falcate; auricles large; upper cells rhombic-rectangular; costa sulcate nearly entire. Capsules unknown. Tufts sparingly radiculose, greenish or blackish, often high. Habit of *Dicranum longifolium*. — Rocks in alps and near Atlantic sea. *Eur.* Switzerl. Irel.: Holt. Norway: R. Hartman.

***C.micans** Wulfsberg.

Tufts yellowish more radiculose. Leaves often falcate. Pedicels of capsules clustered. — *Eur.* Norway: Wulfsberg. Sweden: P. Larsson.

C. Leaves gen. denticulate above, us. flexuous when dry; costa not hyaline at apex, us. subpercurrent.

17 C.flexuosus L. — *Bryum* L.; *Campylopus* Bridel.

Leaves often auricled; upper cells suboval-rhomboidal, the alar us. brown-yellow; costa occupying about half lamina at base, sulcate only at apex. Tufts us. brown-tomentose. Less r. fruiting. — Turfy soil and moist sandstone rocks. *Eur.* not r. Switzerl. *Amer.* r. »U. S.»: Sulliv.

***C.zonatus** Molendo.

Leaves more distinctly denticulate; alar cells purplish (as tomentum of stem); costa narrower. — *Eur.* r. France: Le Jolis.

***C.paradoxus** Wilson.

Leaves gen. entire; costa narrower, percurrent. Tufts less radiculose. Capsules unknown. — Peaty soil r. *Eur.* Engl.: Wood, com. Husnot. Sweden: P. Olsson.

***C.tallulensis** Sull. et Lesq.; Sulliv. icon. m.

Leaves narrower, denticulate near apex; costa percurrent.

Tufts sparingly radiculose, yellowish green. Capsules unknown.
— Wet rocks r. — *Amer.* »U. S.»: Sullivant.

93. **Dicranella** Schimper.

I. **Anisothecium**. Leaves spreading, from sheathing base horizontally patent or deflexed. Capsule inclined; pedicel red.

II. **Pseud-Oncophorus**. Leaves flexuous or erect-patent, not spreading. Capsule inclined distinctly necked and strumose; pedicel yellow (reddish only when old).

III. **Eu-Dicranella**. Leaves not spreading. Capsule not distinctly necked; pedicel red or (in *D. heteromalla*) yellow.

I. **Anisothecium** (Mitten) Lindberg.

A. Leaves large gradually tapering to the broad acumen. Stem us. high. R. fruiting.

1. **D.squarrosa** Starke. — *Dicranum* St.; *Dicranella* Schimp.

Leaves with nearly entire often obtuse acumen; upper cells oval or suboblong; costa not percurrent. Capsule large not striate. — Moors princ. in alps. *Eur.* not r. Norway (fruit.), Sweden, Switzerl.! *Engl.* (fruit.): Manchester Cryptog. Society. *Amer. Can.*: Macoun.

B. Leaves less large abruptly tapering to the long subulate acumen. Stem us. low.

2. **D.Schreberi** Swartz. — *Dicranum* Sw.; *Dicranella* Schimp.; *Cynodontium canadense* Mitten; *Dichodontium* Lq. et Jam.

Leaves with an in upper part serrulate acumen; cells irregular often rhomboidal, upper suboblong; costa percurrent. Capsule smooth not large. — Clay soil not r. *Eur.* Sweden!; Lindberg; M. Huss. *Engl.*: Holt. *Amer. Can.*: Macoun.

3. **D.Grevillei** Bryol. eur.

Leaves entire; cells oblong-lanceolate; costa excurrent. Capsule small finally striate or sulcate, indistinctly strumose. — Clay soil princ. in alps r. *Eur.* Norway, Switzerl.! Sweden: M. Huss. *Amer. Can.*: Drummond; Macoun.

II. **Pseud-Oncophorus** Kindb.

4. **D.cerviculata** Hedwig. — *Dicranum* H.; *Dicranella* Sch.

Leaves from half-sheathing base abruptly narrowed to a long subulate acumen, us. flexuous or crisped; cells narrow irregular; costa broad long-excurrent. Capsule finally plicate; teeth cleft to middle. Tufts yellowish green. — Bare soil on wet heaths and in ditches. *Eur.* common. Sweden! *Amer. Can.*: Macoun.

* **D.pusilla** Hedwig. — *Dicranum* H.; *Dicranella* Sch.

»Plants smaller. Leaves shorter, nearly straight and not

flexuous. Capsule very small, less distinctly strumose. — Higher alp. region r. *Eur.* Switzerl.: Schimper.

5.D.polaris Kindb. note on Canad. bryol. 1893.

Differs from *D. cerviculata*: Plants smaller. Leaves shorter nearly straight and not flexuous; upper cells suboblong; costa broader, filling the whole acumen. Capsule very small and not striate, less distinctly strumose; teeth nearly entire or faintly cleft. Stem very short. — Arctic distr. r. *Amer.* Alaska: J. M. Macoun.

6.D.cerviculatula Kindb. l. c.

Differs from *D. cerviculata*: Leaves gradually narrowed; cells short quadrate, only the inner basal narrow; costa narrower and well-defined, only in perichetial leaves distinctly excurrent. Tufts dark green. — *Amer.* r. Can. Hudson Strait: R. Bell, com. Macoun.

III. Eu-Dicranella.

A. Leaves channelled; costa long-excurrent.

a. Leaves abruptly acuminate from the us. half-sheathing base

7.D.secunda Swartz. — Dicranum Sw. 1795; Dicranella Lindberg; *D. subulata* (Hedwig 1801) Schimper.

Leaves entire with suboblong base, subfalcate not crisped; lower cells narrow, the upper oblong; costa gen. entire. Capsule cernuous finally sulcate; teeth cleft to middle; lid long-rostrate; annulus revoluble. — Wet stony ground princ. in alps. *Eur.* not r. Sweden, Norway, Switzerl. Finl.: Brotherus. *Amer.* Can.: J. Macoun. Alaska: J. M. Macoun.

***D.curvata** Hedwig. — Dicranum H.; Dicranella Sch.

Leaves with shorter base; costa denticulate above. Perichetial leaves not convolute. Capsule us. erect. — Wet sandstone rocks r. *Eur.* Germany: Huebner. France: Boulay, com. Husnot. *Amer.* »U. S.»: Lesq. et Jam.

8.D.crispa Ehrhart. — Dicranum Ehrh.; Dicranella Sch.

Leaves entire with subovate base, crisped when dry; cells gen. narrow; costa minutely denticulate near apex. Capsule erect finally sulcate; teeth red-brown cleft to middle; lid long-rostrate; annulus not wholly revoluble. — Sandy ground. *Eur.* not r. Norway, Sweden! Engl.: Holt. *Amer.* Can.: Macoun.

9.D.parvula Kindb. bull. Torr. club 1889.

Leaves crenulate all around with subovate base, crisped or curved when dry; basal cells long linear, upper oblong-quadrate; costa denticulate above. Capsule inclined or suberect; teeth

orange nearly partite; lid short subobtusate or apiculate; annulus scarcely loosed; pedicel pale red. Stem very short. — Earth in higher alp. region r. *Amer.* Can. Rocky mts 1950 metr. a. s.: Macoun.

b. Leaves gradually acuminate from not sheathing base. Pedicel yellow.

10. **D. heteromalla** L. — Bryum L.; Dicranella Sch.

Leaves flexuous or straight when dry, sometimes denticulate; lower cells long, upper shorter; costa broad us. denticulate near apex. Capsule nitid orange more or less oblique and inclined, r. suberect, finally sulcate; teeth cleft to middle; lid long-rostrate. Tufts us. green often soft and silky-like. — Damp earth and rocks common. *Eur.* Sweden, Norway, Germany, Switzerl. *Amer.* Can.: J. Macoun; Waghorne. Alaska: J. M. Macoun. U. S.: com. Macoun (a variety with longer not distinctly sulcate capsule).

* **D. Fitzgeraldi** Renauld et Cardot.

Capsule suberect and subsymmetric. — *Amer.* U. S.: Fitzgerald, com. Cardot.

B. Leaves carinate gradually acuminate not sheathing; costa gen. not excurrent. Capsule not or indistinctly striate. Tufts low us. not shining.

a. Leaves entire, recurved below; alar cells us. dilated.

11. **D. rubra** Dickson. — Bryum Dicks.; Dicranella Brotherus; D. varia Schimper; D. Howei and D. Langloisii Renauld et Cardot.

Leaves ovate-lanceolate or ovate-oblong us. nearly straight; upper scarcely longer; cells gen. narrow exc. the alar. Capsule inclined red-brown us. oblique; teeth us. not deeply cleft; lid rostellate not longer than half capsule; annulus none. Tufts yellowish green. — Damp clay soil and rocks. *Eur.* common. Sweden, Switzerl. Italy: Arcangeli. *Amer.* not r. Can.: Macoun. U. S.: Sullivant; Howe; Langlois, com. Cardot (a var. with short leaves).

* **D. callistoma** Dickson. — Bryum Dicks.; Dicranella Sch.

Capsule smaller, subsymmetric often erect, gen. not longer than lid. — Rocks princ. in subalp. distr. r. *Eur.* Engl.: Rogers. France: Le Jolis. Greece: Heldreich.

12. **D. debilis** Hooker et Wilson. — Dicranum H. W.; Sulliv. ic. m.; Dicranella Lq. et Jam.; D. leptotrichoides Ren. et Card.

Differs from *D. rubra* **callistoma*: Capsule annulate; teeth nearly partite. Upper leaves much longer than the lower. —

Ditches and roadsides r. *Amer.* U. S.: Sulliv. et Lesq., com. Renauld; Langlois, com. Cardot.

b. Leaves serrulate above, not recurved; alar cells not defined.

13. *D. rufescens* Dickson. — Bryum Dicks.; Diceranella Sch.

Leaves longer upwards, nearly straight or curved; the uppermost narrowly ovate-lanceolate; cells less narrow than in *D. rubra*. Capsule symmetric blood-red us. erect; teeth cleft nearly to middle; lid rostellate us. half as long as capsule; annulus none. Tufts often rufescent. Male plants resembling a *Phascum*. — Wet clay and stony ground. *Eur.* not r. Sweden: R. Hartman; M. Huss. *Amer.* Can.: J. Macoun. Alaska: J. M. Macoun.

*** *D. humilis* Ruthe.**

Capsule inclined and curved when dry. Leaves pale green, the upper more flexuous. — Sandy and clay soil r. *Eur.* Norway: N. Bryhn.

94. *Diceranoweisia* Lindberg.

A. Leaves recurved gradually acuminate; costa not excurrent. Peristomial teeth not cleft; annulus revoluble.

1. *D. cirrata* L. — Mnium L.; Diceranoweisia Lindb.

Leaves subulate acuminate; alar cells not well-defined; costa subpercurrent. Perichetial leaves abruptly narrowed to a shorter acumen; costa vanishing below it. Capsule erect cylindric pale or yellowish brown. Tufts pale green. — Logs and rocks not r. *Eur.* Sweden, Switzerl.! *Amer.* Can.: Macoun.

B. Leaves not recurved. Peristomial teeth us. cleft; annulus indistinct.

a. Leaves abruptly acuminate; costa not excurrent. Capsule straight symmetric. Perichetial leaves very short.

2. *D. crispula* Hedwig. — Weisia H.; Diceranoweisia Lindb.

Leaves with long subulate channelled acumen; alar cells well-defined. Capsule pale brown us. oval-oblong, or cylindric when young, r. cylindric when old; teeth sometimes entire. Perichetial leaves short-apiculate. Tufts brown or blackish when dry. — Rocks princ. in alps, common in alp. regions. *Eur.* Norway, Switzerl.! Sweden: Miss O. Cron. Spetsbergen: Berggren. *Amer.* Greenl.: Berggren. Alaska: J. M. Macoun. Can.: J. Macoun; Waghorne. U. S.: Henderson, com. Cardot.

3. *D. compacta* Schleicher. — Grimmia Schl.; Diceranoweisia Schimp.

Differs from the last: Leaves with sublinear not long often

obtuse acumen: perichetial longer-apiculate. Capsule suboval red-brown smaller. Tufts lower often green. — Rocks in higher alp. regions r. *Eur.* Switzerl.; Schimper. Italy: Husnot m. gall. Norway: R. Hartman. Sweden: E. Adlerz; E. Nyman.

b. Leaves nearly gradually long-subulate; costa excurrent. Perichetial leaves long-acuminate. Tufts green. Capsule small. 4. **D. Roellii** Kindb. in Hedwigia 1896 p. 59.

Alar leaf-cells not well-defined or rectangular. Perichetial leaves abruptly narrowed to a by costa often wholly filled acumen. Capsule red-brown round-oval symmetric not strumose; pedicel flexuous or arcuate when dry, not long. Tufts very compact. — Rocks in higher alp. region r. *Amer.* U. S. Oregon mt Hood 2400 metr. a. s. near a glacier: J. Roell.

5. **D. obliqua** Kindb. note on Canad. bryol. 1893.

Alar leaf-cells quadrate well-defined. Perichetial leaves less abruptly acuminate, not filled by costa in lower part of acumen. Capsule pale brown suboblong inclined curved or subobovate with very small mouth, often strumose; pedicel long straight or slightly curved. — Stones in alp. region r. *Amer.* Pacif. distr. Can. Brit. Col.: J. Macoun. Alaska: J. M. Macoun.

95 **Oncophorus** Bridel.

1. **O. virens** Swartz. — Bryum Sw.; Oncophorus Brid.; Cynodontium Schimper; C. Demetrii Ren. et Card. ?

Leaves reflexed at borders, from suboblong base less abruptly tapering to the attenuate acute entire or in upper part densely denticulate acumen, more or less crisped when dry. Perichetial leaves abruptly acuminate to the long-excurrent costa. Capsule subovate. — Rocks princ. in alps. *Eur.* common in alps. Norway, Switzerl. Sweden: P. Dusén. *Amer.* Can.: Macoun; Waghorne.

2. **O. Wahlenbergii** Bridel.

Leaves not reflexed, from broad base abruptly tapering to a sublinear entire or at apex obsoletely denticulate acumen, much crisped. Perichetial leaves less abruptly tapering to a by costa not wholly filled acumen. Capsule subovate or subobovate. — Alp. swamps and rocks. *Eur.* not common. Norway! Sweden: Arnell. Italy: Payot, com. Husnot. *Amer.* Can. common in eastern colder districts: J. Macoun; Drummond; Waghorne. Greenl.: Berggren. Alaska: J. M. Macoun; Palmer.

* **O. compactus** Funck. — Dicranum Funck; Oncophorus Kindb.

Leaves entire smaller. Stem and pedicel shorter; capsule

smaller. — Rocks in alp. princ. arctic districts r. *Amer.* Greenl.: Vanhoeffen. Can.: Waghorne. *Eur.* »Sweden»: Hartman.

96. **Rhabdoweisia** Bryol. eur.

A. Peristomial teeth brittle us. with broad base. Leaves gradually acuminate us. entire.

1. **R. striata** Schrader. — *Grimmia* Schrad. 1799; *Rhabdoweisia* Kindb.; *Weisia fugax* Hedwig 1801.

Leaves sublinear acute, curled when dry. Capsule suboval pale ferruginous; pedicel yellow very short. — Fissures of rocks. *Eur.* not r. Sweden, Norway, Switzerl. *Amer.* r. Can. Sudbury Junction: Macoun.

B. Peristomial teeth persistent subulate. Leaves obtusate serrulate above.

2. **R. crispata** Dickson. — *Bryum* Dicks. 1793; *Rhabdoweisia* Kindb.; *Weisia denticulata* Bridel 1806.

Leaves linear acute, more or less curled. Capsule suboblong brownish; pedicel yellow. — Fissures of rocks. *Eur.* somewhat r. Sweden, Switzerl. *Engl.*: Rogers. *Amer.* r. Can.: Drummond, com. Macoun.

3. **R. crenulata** Mitten. — *Didymodon* Mitt.; *Rhabdoweisia* Jameson; *Oncophorus* Braithwaite.

Leaves sublinear gen. obtuse, broader and more strongly serrulate than in the last, not much curled; cells larger. Capsule oval rufous or reddish; teeth sometimes cleft; pedicel finally pale red. — Wet rocks r. *Eur.* France cascade d'Enfer near Bagnères de Luchon 1855! *Engl.*: T. Rogers.

97. **Oreas** Bridel.

1. **O. Martii** Hoppe et Hornschuch. — *Weisia* Hop. et Hsch.; *Oreas* Brid.; *Oncophorus* Lindb.

Leaves entire sublinear acuminate or with broader base, recurved below. Capsule suboval rostellate; pedicel arcuate when moist. Tufts very dense often high. — Rocks in alp. regions r. *Eur.* Switzerl. *Austria*: Schimper.

Fam. 22. **Seligeriaceæ.**

98. **Seligeria** Bruch et Schimper.

I. **Anodus.** Peristome none. Leaves denticulate.

II. **Eu-Seligeria.** Peristome present. Leaves entire or (sometimes in *S. pusilla*) faintly crenulate.

I. **Anodus** Bryol. eur.

1. **S. Donii** Smith. — *Gymnostomum* Sm.; *Seligeria* C. M.

Leaves channelled shortish; costa long-excurrent. Capsule

piriform; pedicel straight. Stems very short not tufted. — Limestone and sandstone rocks. *Eur.* Switzerl.! Sweden: J. Hulting. Norway: Arnell. Engl.: Rogers. *Amer.* Can.: Drummond; Macoun.

II. Eu-Seligeria.

A. Leaves long subulate-acuminate plurifarious; costa us. excurrent.

a. Stem very short. Capsule piriform or subclavate.

2.S.recurvata Hedwig. — *Grimmia* H.; *Seligeria* Br. et Sch.; *S. setacea* (Wulfen) Lindb.

Leaves with long-excurrent costa. Capsule piriform; teeth obtuse or subacute; pedicel us. arcuate. Loosely tufted. — On sandstone. *Eur.* not r. Sweden, Italy, Switzerl.! Engl.: Rogers. *Amer.* Can.: Drummond; Macoun.

***S.erecta** Philibert. — »*Weisia Seligeri* Hooker et Wilson»: Lq. et Jam.

Leaves shorter. Pedicel us. straight erect. — Rocks r. *Eur.* Switzerl.: Philibert. *Amer.* »U. S.: Drummond»: Lesq. et Jam.

3.S.pusilla Ehrhart. — *Afzelia* Ehrh.; *Seligeria* B. S.

Leaves of fruiting stem with a not distinctly excurrent costa. Capsule piriform erect; teeth obtuse; pedicel straight. Loosely tufted. — Damp shady rocks of limestone or sandstone. *Eur.* Switzerl.! Sweden: E. Adlerz. Norway: E. Nyman. Engl.: Whitehead. *Amer.* »Can. and U. S.»: Lesq. et Jam.

***S.acutifolia** Lindberg.

Leaves with more distinctly excurrent costa. Pedicel often very short. — *Eur.* r. Engl.: Rogers.

4.S.paucifolia Dickson. — *Bryum* Dicks.; *Seligeria* Carruthers; Braithwaite; *S. subcernua* Schimper.

Leaves with us. short-excurrent costa. Capsule subclavate sometimes inclined; teeth acute; pedicel suberect flexuous. — Chalk blocks r. *Eur.* »Engl.»: Braithwaite.

b. Stem somewhat high about 1 c. m. Capsule subglobose or oval.

5.S.polaris Berggren.

Leaves with long excurrent costa. Capsule subglobose; teeth subacute somewhat long; pedicel exerted not or slightly curved. Densely tufted. — On earth in arctic district r. *Eur.* Spetsbergen; Berggren, com. A. G. Nathorst.

6.S.subimmersa Lindberg musci scandinav.

»Differs from *S. recurvata* in the stem higher, to 1 c. m.; angular leaf-cells dicranoid; capsule oval scarcely emergent

above perichetial leaves; tufts very dense. — *Eur. r. Finl.: Silén*: Lindberg.

B. Leaves short us. obtuse. Stem low.

a. Leaves obtuse, tristichous princ. on sterile shoots. Stem and shoots somewhat elongate. Capsule piriform with straight pedicel; teeth obtuse.

7.S.tristicha Bridel. — Weisia Brid.; Seligeria B. S.

Leaves sublinear; costa distinctly excurrent. Perichetial leaves gradually acuminate; costa long-excurrent. — Dripping calcareous rocks *r. Eur. Engl.: Rogers; Cash. France: Boulay. Amer. Can.: Macoun.*

8.S.tristichoides Kindb. revue bryol. 1896.

Leaves sublinear, broader than in the last; costa not distinctly excurrent. Perichetial leaves abruptly acuminate; costa percurrent or short-excurrent. — *Eur. r. Norway in northern district: Schlegel and Arnell; E. Nyman.*

b. Leaves plurifarious. Stem and shoots very short.

9.S.calcareo Dickson. — Bryum Dicks.; Seligeria B. S.

Leaves subovate abruptly attenuate; costa excurrent. Capsule piriform erect; teeth obtuse; pedicel straight. — Calcareous or schistaceous rocks *r. Eur. Switzerl. France: Husnot m. gall. Amer. Can.: Drummond; Macoun.*

* **S.crassinervis** Lindberg.

»Capsule inclined; teeth acute; pedicel slightly curved at apex. — *Eur. r. Sweden*: Lindberg.

10.S.diversifolia Lindberg. — *S. compacta* Philibert rev. bryol. 1897 ?

Leaves (also the perichetial) sublinear or narrowly ovate-oblong, gradually attenuate obtuse; costa not excurrent. Capsule erect narrowly piriform; teeth subobtuse; pedicel straight. — Calcareous rocks *r. Eur. Finl.: Brotherus.*

* **S.obliquula** Lindberg.

Capsule broader; teeth acute; pedicel slightly curved when dry. — *Alp. rocks r. Eur. Norway in Dovrefjeld: Kaurin.*

11.S.campylopoda Kindb. cat. Canad. m.

Leaves as in the last but the upper perichetial acute or subacute. Capsule narrowly piriform finally sulcate; pedicel strongly arcuate when moist. — Calcareous rocks *r. Eur. A. Blytt and H. W. Arnell. Amer. Can.: Macoun; Waghorne.*

99. **Brachydontium** Bruch.

1.B.trichodes Weber fil. — *Gymnostomum* W. f.; *Brachydontium* Bruch.

Leaves ovate-oblong shorter than the by costa nearly wholly filled point, curled when dry. Capsule oblong sulcate when dry; teeth pale truncate not reaching above annulus; lid rostellate; pedicel erect. Stems not tufted. — Rocks. *Eur.* princ. in middle and south. distr. Germany! France: Boulay. Austria: Breidler. *Amer.* »U. S.»: Lesq. et Jam.

100. **Trochobryum** Breidler et Beck.

1. **T. carnolicum** Breidler et Beck.

Leaves subovate-oblong; the upper flexuous or deflexed with a many times longer costa. Capsule rotundate or round-oval not sulcate; teeth blood-red truncate; lid systylic convex with short thick point; pedicel erect. — Moist calcareous rocks r. *Eur.* Serbia: Ilie, com. C. Mueller.

101. **Blindia** Bruch et Schimper.

I. **Eu-Blindia.** Capsule exserted; lid soon deciduous; peristome present. Dioecious.

II. **Stylostegium.** Capsule immersed; lid often systylic; peristome none. Monoecious.

I. Eu-Blindia.

1. **B. acuta** Hudson. — *Bryum* Huds.; *Blindia* Br. eur.

Leaves broadly ovate-lanceolate gradually acuminate, nearly straight, gen. not much longer than the excurrent part of costa; alar cells red large quadrate; costa us. smooth. Perichetial leaves abruptly acuminate larger. Capsule suboval-piriform or globose with short neck; lid red-rostrate; teeth red; annulus not distinct; pedicel straight reddish. Tufts us. brown. — Wet rocks princ. in alps. *Eur.* not uncommon. Sweden, Norway, Switzerl.! *Amer.* Can.: Macoun; Moser; Waghorne. Greenl.: Vanhoeffen.

2. **B. flexipes** (Renaud et Cardot as var.) Kindb. n. sp.

Leaves as in the last but often falcate; costa denticulate above, shorter-excurrent. Perichetial leaves gradually acuminate. Capsule as in the last; pedicel flexuous arcuate yellow above. Tufts green or yellowish green. — Wet rocks r. *Amer.* Pacif. distr. Can.: Macoun. U. S.: Howell, com. Cardot.

II. *Stylostegium* Bryol. eur.

3. **B. caespiticia** Schwægrichen. — *Anoetangium* Schw.; *Blindia* C. Mueller.

Leaves suboblong gradually acuminate nearly straight; alar cells brown subquadrate; costa long-excurrent. Perichetial leaves less gradually acuminate and very much larger; costa short-excurrent. Capsule obovate or turbinate; lid yellow-rostrate;

pedicel straight yellowish. Resembling small forms of *B. acuta* in habit. — Alp. rocks r. *Eur.* Norway! *Scotl.*: Hunt.

Fam. 23. **Grimmiaceæ.**

102. **Grimmia** Ehrhart.

A. Leaves spirally twisted about stem when dry.

I. Streptophyllum. Leaf-cells more or less sinuous. Capsule exerted smooth; pedicel longer, us. deflexed; lid not systylic; peristome present. Dioecious r. fruiting.

B. Leaves not spirally twisted.

II. Eu-Grimmia. Leaf-cells not distinctly sinuous. Capsule shorter than the gen. exerted pedicel; lid not systylic; peristome present.

a. Leaves smooth obtusate entire and not sheathing, appressed when dry and not patent when moist; cells large; hairpoint very short or wanting. Dioecious.

1. **Molliformes.** Leaves large. Tufts gen. loose. Stem elongate.

2. **Velutinæ.** Leaves very small. Tufts compact pulvinate very low.

b. Leaves smooth or (in *G. cespiticia*) papillose, us. acuminate, patent when moist; cells small; hairpoint often long. Often monoecious. Tufts us. pulvinate.

3. **Pulvinatæ.** Leaves gradually narrowed or obtuse, not sheathing; cells us. short. Capsule often striate; pedicel often curved.

4. **Alpestriformes.** Leaves abruptly narrowed from half-sheathing base; basal cells often long. Capsule not striate; pedicel r. curved.

c. Leaves papillose crenulate, appressed when dry; cells small.

5. **Andreæoides.** Capsules unknown.

III. Pseudo-Racomitrium. Leaves ovate-lanceolate or sublinear; cells (princ. the upper basal) sinuous, the inner basal narrow-linear. Capsule as in *Eu-Grimmia*.

a. Leaves carinate above, often recurved below.

aa. Leaves (princ. the younger) papillose. Dioecious.

1. **Papillosæ.** Leaves not crisped but often nearly appressed when dry. Pedicel of capsule arcuate.

bb. Leaves smooth. Often monoecious.

2. **Crispulae.** Leaves very narrow sublinear us. crisped. Pedicel of capsule arcuate or straight. Dioecious very r. fruiting.

3. **Trichophylloideæ.** Leaves less narrow, ovate-lanceolate not crisped. Capsule often striate-sulcate; pedicel arcuate when moist. Plants often robust.

4. **Ovatæformes.** Leaves ovate-lanceolate not crisped. Capsule smooth; pedicel not arcuate. Plants gen. not robust.

b. Leaves channelled above, not recurved.

5. **Unicoloriformes.** Leaves smooth us. narrowly ovate-lanceolate, not or faintly crisped; upper cells us. opaque. Pedicel straight or arcuate, sometimes not emergent. Dioecious.

IV. **Pseudo-Schistidium.** Leaf-cells sometimes sinuous. Capsule immersed longer than pedicel; lid not systylic.

1. **Piliferæ.** Leaves channelled or near apex carinate, recurved below at both sides; cells sinuous. Peristome present. Dioecious.

2. **Crinitæ.** Leaves concave not recurved; cells often not sinuous. Peristome present or wanting. Us. monoecious.

V. **Schistidium.** Leaf-cells sometimes sinuous. Capsule immersed longer than pedicel; lid systylic. Monoecious.

1. **Platyphylloideæ.** Leaves channelled; cells gen. not sinuous.

2. **Apocarpæformes.** Leaves carinate; cells not r. sinuous.

I. *Streptophyllum* Kindb.

A. Leaves sublinear-subulate, gradually or nearly gradually narrowed from the not distinctly sheathing and (when moist) not appressed base; hairpoint short often wanting.

1.G.torquata Hornschuch.

Leaves gradually narrowed, open when moist; cells thick-walled finally yellow, nearly all rectangular and sinuous; costa pellucid. Tufts not cohering finally yellowish (when moist). Capsule with arcuate pedicel. — Rocks princ. below alps. *Eur.* Sweden!; Lindberg. *Finl.*: Brotherus. *Amer.* Can.: Macoun. U. S. fruiting: Leiberg, com. Mrs Britton.

2.G.prolifera C. M. et Kindb. cat. Can. m.

Leaves nearly gradually narrowed, spreading when moist; cells thin-walled faintly yellowish: basal narrow-rectangular and more or less sinuous, upper subquadrate not sinuous; costa faintly pellucid. Tufts cohering blackish below. Capsules unknown. Stem sometimes proliferous with long green loosely foliated shoots. — Alp. rocks r. *Amer.* Can. Brit. Col.: Macoun; N. Foundl.: Waghorne.

B. Leaves abruptly narrowed from sheathing base; upper cells short quadrate not sinuous; hairpoint often long.

3. *G. funalis* Schwægrichen. — *Trichostomum* Schw.; *Grimmia* Schimp.

Leaves with subulate acumen, shorter than in *G. torquata* and not large, us. brown when moist; cells not yellow: basal rectangular, middle short-rectangular or subquadrate sinuous, upper dusky very small and not well-defined; costa brown opaque; hairpoint often long. Capsule with arcuate pedicel. Tufts not cohering, blackish or r. pale brown. Less r. fruiting. — Alp. rocks. *Eur.* not r. Norway, Switzerl.! Sweden: R. Hartman. France: Husnot. *Amer.* Greenl.: Berggren.

4. *G. tortifolia* Kindb. enumer. bryin. dovreus. — *G. streptophylla* Kindb. Laubm. Schwed. u. Norw.

Leaves small and short, subovate-oblong with acute or sub-obtuse acumen, us. dark green when moist; cells gen. not yellow: nearly all quadrate and not distinctly sinuous, only the lowest basal rectangular hyaline; upper cells well-defined larger than in the last and not dusky; costa not opaque; hairpoint very short us. wanting. Capsules unknown. Tufts densely cohering, dark green when dry. — Alp. rocks r. *Eur.* Norway in Dovrefjeld!

* ***G. calvescens*** Kindb. enum. bryin. dovr. — *G. imberbis* Kindb. botan. notiser.

Leaves small subovate or subovate-oblong gen. obtuse, green when moist; cells not (or r. faintly) yellow: all basal rectangular, the middle faintly sinuous. Capsule suberect with nearly straight pedicel. — Alp. rocks r. *Eur.* Norway, Switzerl.! Sweden: E. Nyman. Austria: Venturi. *Amer.* U. S.: Roell.

* ***G. pellucida*** Kindb. in Hedwigia 1896 p. 64.

Leaves larger and longer, ovate-lanceolate subacute bright green; cells pale pellucid, nearly all quadrate and not distinctly sinuous; costa pellucid. Capsules unknown. Tufts pale green when dry. — *Amer.* r. Can. Brit. Col. and Vanc. isl.: Macoun. U. S.: Roell.

* ***G. pseudo-torquata*** Kindb. n. subsp.

Leaves somewhat larger, ovate-lanceolate acute, green or the uppermost yellow when moist; basal and middle cells sinuous and rectangular; costa nearly opaque. Capsules unknown. Habitat of *G. prolifera*. — Alp. and subalp. rocks r. *Eur.* Norway in Dovrefjeld and Gudbrandsdall Sweden in Jemtland: P. Dusen.

* **G. Ryani** Kaurin.

Resembling a large form of *G. funalis* and more robust. Leaves large broadly ovate-lanceolate acute, gen. brownish or the uppermost pale yellow when moist; basal and middle cells sinuous and rectangular; costa brown opaque; hairpoint often present. Capsule with arcuate pedicel. Tufts gen. not or loosely cohering when moist, brown when dry, often high. — Alp. rocks r. *Eur.* Norway!; Ryan, com. E. Nyman.

II. *Eu-Grimmia*.

1. *Molliformes*.

5. **G. mollis** Br. eur. — *G. orthotrichoides* Hartman.

Leaves crowded not carinate, oval-ovate or broadly ovate-oblong; those of stem gen. acute, those of branches obtuse; the acute leaves often furnished with a short hairpoint, the others muticous. Perichetial leaves short-acuminate often with longer hairpoint. Capsule smooth suboval not wholly exserted above perichetial leaves; lid short-apiculate; pedicel straight longer than capsule; calyptra cucullate. Tufts cohering and brown-green when dry, about 2 c. m. or lower. R. fruiting. — Moist alp. rocks r. *Eur.* Norway: Hj. Holmgren, detector of this species. Sweden: E. Nyman. France: Husnot. *Amer.* Greenl.: Berggren.

* **G. submersa** Kindb. n. subsp.

Leaves obtuse muticous decurrent loosely disposed; the perichetial obtuse or subacute r. with short hyaline point. Capsule wholly exserted. Tufts dark green, less or not cohering. Stem 3—5 c. m. or much longer. Very r. fruiting. — Rocks in alp. rivulets r. *Eur.* Norway!; Kaurin.

2. *Velutinae*.

6. **G. Manniæ** C. Mueller in *Flora* 1887.

Leaves broad-ovate subobtusate, carinate above, not recurved; cells subquadrate, the upper dusky; hairpoint sometimes present. Capsule suboval red-brown not striate; lid conic; pedicel arcuate or finally erect. Tufts dark green when dry, about 0.5 c. m. high. — *Amer.* r. U. S. Calif.: Mrs. Mann, com. C. Mueller.

7. **G. velutina** Kindb. *revue bryol.* 1896. — «*G. Manniæ*» cat. Can. m.

Leaves as in the last but recurved all around and not carinate; cells subquadrate pellucid; hairpoint r. present. Tufts brown and velvetlike when dry, low as in the last but more compact. Capsules unknown. — Dry rocks r. *Amer.* Can. Brit. Col.: Macoun.

3. Pulvinatæ.

A. Leaves carinate above. Pedicel of capsule arcuate when young and moist. Us. monoecious.

8. *G. pulvinata* L. — *Bryum* L.; *Grimmia* Smith.

Leaves gen. ovate-oblong, more or less recurved below. Capsule emergent brown striate either oval-oblong rostellate or broad-oval with mamillate lid; calyptra mitriform. Tufts 1—2 c. m. high. — Rocks and stone-walls in lower districts. *Eur.* not uncommon. Sweden, Germany, Switzerl. Greece: Heldreich. *Amer. Can.*: Macoun.

* ***G. Philiberti*** Britton in Torr. bot. club XVIII, 2.

»Leaves narrower, recurved all around, often with propagula; basal cells rectangular. Capsule smooth; lid rostellate. Dioecious. — *Amer. r. Idaho: Leiberg*: Britton l. c.

9. *G. orbicularis* Bruch.

Lower leaves ovate-oblong, the upper ovate-lanceolate not recurved at one side. Capsule emergent brown suboval faintly striate; lid obtuse; calyptra cucullate. Tufts about 1 c. m. high. — On stone. *Eur. princ.* in southern distr., somewhat r. Germany: Schimper. France: Zetterstedt. Italy: Arcangeli. Engl.: Rogers.

B. Leaves neither carinate nor recurved. Capsule not striate; pedicel not arcuate when moist. Dioecious.

10. *G. campestris* Burchell. — *G. leucophæa* Greville.

Leaves broadly ovate-lanceolate obtuse concave; basal cells subquadrate; hairpoint nearly smooth and long. Capsule oval reddish brown scarcely emergent; lid short-apiculate; annulus revoluble; calyptra mitriform. Tufts about 1,5 c. m. high. — Siliceous rocks. *Eur.* not r. in lower districts. Sweden, Switzerl. *Amer. U. S.* Roell.

* ***G. sarcocalyx*** Kindb. cat. Canad. m.

Leaves with more distinctly denticulate hairpoint. Capsule broad-oval more emergent by the twice longer pedicel; lid obliquely rostellate. — Subalp. regions r. *Amer. Can.*: Macoun.

11. *G. tenella* C. Mueller.

Leaves ovate-lanceolate channelled; lowest basal cells short-rectangular; hairpoint short or none. Capsule oblong pale brown small; lid apiculate or rostellate; calyptra cucullate; pedicel curved when dry. Tufts about 1,5 c. m. high, blackish when dry. — Rocks in alp. region r. *Amer. Can. Brit. Col.*: Macoun. U. S.: Roell.

4. Alpestriformes.

A. Leaves distinctly sulcate, papillose above and carinate;
12. *G. caespiticia* Bridel. — Dryptodon Brid.; Grimmiä Juratzka.
G. sulcata Sauter.

Leaves ovate-oblong obtuse, not recurved below, suberect when moistened; basal cells short; hairpoint very short us. wanting. Capsule oblong-cylindric chestnut-brown; lid conic; pedicel straight. Tufts olive-green 0,5—2 c. m. high, very dense. Dioecious. — Rocks and stone-walls r. *Eur.* Switzerl.! Austria: Schimper. France: Husnot.

* *G. aretica* C. Mueller.

»Leaves shorter, cucullate at apex. — *Amer.* Greenl.: C. M. in Lange, Greenl. fl.

B. Leaves not or (sometimes in *G. alpestris*) faintly sulcate, smooth.

a. Leaves channelled, not recurved below. Capsule long-exserted. Us. dioecious.

13. *G. commutata* Huebener. — Dicranum ovatum Swartz; Grimmiä Weber et Mohr.

Leaves ovate-lanceolate, flat or subinvolute above, patent when moist, the uppermost much larger; basal cells long, the upper short and opaque; hairpoint rough not long, sometimes wanting. Capsule oval brown; lid rostellate; annulus broad; pedicel straight. Tufts very loose, grayish green above, brown or blackish below, 2—4 centim. high. Dioecious. — Rocks, gen. siliceous, princ. below alps. *Eur.* not r. Sweden, Norway, Switzerl.! *Amer.* Can. Brit. Col.: Macoun. U. S.: Roell.

14. *G. teretinervis* Limpricht.

Differs from the last: Leaves shorter, involute nearly all around, suberect when moist; nearly all cells short; hairpoint us. wanting. Tufts blackish. Stem often with brood-corpuscles. Capsules unknown. — Calcareous rocks r. *Eur.* Switzerl.! Austria: Gander. Greece: Hausskrecht.

15. *G. aretographa* Kindb. rev. bryol. 1896.

Leaves ovate-oblong, involute above, suberect when moist, appressed when dry, the uppermost not larger; basal cells gen. short, the upper short opaque; hairpoint not long. Capsule suboblong brownish; lid apiculate; annulus indistinct; pedicel straight. Tufts cohering us. blackish when dry, about 3 c. m. high. — *Amer.* r. Greenl.: Berggren. Can. Cypress hills: Macoun.

* **G. labradorica** Kindb. n. subsp.

Tufts about 1 c. m. high, brown-green. Inner (lower) basal leaf-cells long. Lid of capsule obliquely rostellate. — *Amer.* r. Can.: Northern Labrador: Macoun 1896.

16. **G. tenerima** Renaud et Cardot. — *G. nivalis* Kindb. bull. Torr. club XVII.

Leaves very broad at base, broadly ovate-oblong, us. recurved in upper part, patent when moist, the uppermost not larger; basal cells short somewhat large, the upper short opaque; hair-point us. wanting, in perichetial leaves somewhat long. Capsule oblong-oval brownish; lid muticous or obliquely rostellate; annulus indistinct; pedicel us. curved when dry. Tufts us. cohering, blackish when dry, about 1 c. m. high. — Rocks in alp. region r. *Amer.* Pacif. distr. Can.: Macoun. U. S.: Roell; Henderson, com. Cardot.

b. Leaves carinate. Capsule us. not exserted above perichetial leaves.

17. **G. montana** Bryol. eur.

Leaves ovate-lanceolate, not recurved below, patent when moist; basal cells long; hairpoint long and rough. Capsule oval-oblong reddish brown; lid rostellate; annulus nearly indistinct; pedicel straight distinctly exserted above perichetial leaves. Tufts cohering us. green, about 1—2 c. m. high. Dioecious. — Rocks also below alps. *Eur.* not r. Sweden, Norway, Switzerl.! Germany: Schimper. *Amer.* r. Can., Brit. Col.: Macoun.

18. **G. alpestris** Schleicher.

Leaves broadly ovate-lanceolate or ovate-oblong, not recurved below, gen. patent when moist; basal cells short; hairpoint long nearly smooth. Capsule brown us. oblong-cylindric; lid muticous; annulus indistinct; pedicel straight. Tufts us. cohering, blackish or grayish green when dry, glaucous green when moist, about 1 c. m. high. Us. dioecious. — Alp. rocks. *Eur.* less r. Norway, Switzerl., Spain! *Amer.* r. Can.: Macoun.

* **G. Unger** Juratzka.

Capsule oval; lid apiculate. Monoecious. — *Eur.* r. Scotl.: Fergusson.

* **G. subsulcata** Limpricht.

Leaves faintly sulcate. Capsule pale brown; pedicel sometimes curved (in Austrian specimens straight). Often monoecious. »Capsule with large stomata»: Limpricht. — Alp. region r. *Eur.* Switzerl.! Austria: Gander.

19. *G. subsquarrosa* Wilson; Braithwaite. — »*G. Muehlenbeckii* var.» Limpricht.

Leaves ovate-lanceolate recurved below at both sides, spreading when moist; inner basal cells quadrate, the alar rectangular; hairpoint long rough. Capsules unknown. Tufts fuscous-green above, 1—3 c. m. high. Stem with brood-corpuscles. — Rocks r. *Eur.* Engl.: H. Boswell. Belgium: Gravet.

5. *Andreæoides*.

20. *G. (?) andreæoides* Limpricht.

»Leaves obtuse mucous concave not carinate and not recurved, appressed when dry; the uppermost suddenly larger from ovate-oblong base gradually acuminate; the lower and those of shoots ovate-oblong very small; upper cells round-oval, lower gen. rectangular; costa with brood-corpuscles. Capsules unknown. Tufts reddish or blackish brown. Stem 1,5 c. m. high or lower with numerous shoots. Allied to *G. torquata*, but leaves not are twisted. — Rocks in alp. region r. *Eur.* Austria: Breidler»: Limpricht.

III. *Pseudo-Racomitrium* Kindb.

1. *Papillosæ*.

21. *G. elatior* Bruch.

Leaves ovate-lanceolate acute, recurved below to middle on both sides; middle cells subquadrate or short-rectangular; alar cells rectangular; costa papillose; hairpoint nearly smooth often long. Capsule oval sulcate or costate; lid rostrate; pedicel often not emergent above perichetial leaves. Plants robust often high. Tufts loose, blackish below, fuscous green above. — Rocks princ. below alps. *Eur.* not r. Sweden, Switzerl. Norway: M. N. Blytt. *Amer.* »Greenl.: Vahl»: Lange.

*** *G. papillosa* Kindb.** Laubm. Schw. u. Norw. — *G. elatior* var. *subfunalis* Limpricht.

Leaves more distinctly papillose, less acute, more appressed when dry; hairpoint short or wanting. Tufts lower (about 3 c. m.) blackish green more dense. Capsules not found. — Alp. rocks r. *Eur.* Norway!

*** *G. anomala* Hampe.**

»Leaves subobtuse often with brood-corpuscles at apex; hairpoint short dentate or wanting. — Alp. rocks r. *Eur.* Austria and Switzerl.»: Limpricht.

22. *G. Lisæ* Notaris.

Leaves ovate-lanceolate acute, not distinctly recurved below at one side, subfalcate when moistened; nearly all cells rectan-

gular, alar not hyaline; hairpoint rough often short. Capsule oblong nearly smooth. Stem about 2 c. m. high. Habit of *G. trichophylla*. — Rocks r. *Eur* Switzerl.! Belgium: Gravet. Italy: Venturi. *Amer.* Can. Rocky mts and Vanc. isl.: Macoun.

* *G. sardoa* Notaris; C. Mueller syn.

»Leaves curved at apex, revolute to above middle; lower cells short. Capsule globose. Plants small. — *Eur.* r. Italy: Notaris»: C. M.

2. Crispulæ.

23. *G. incurva* Schwægrichen. — *Dicranum contortum* Wahlenberg; *Grimmia* Schimper.

Leaves sublinear-subulate with thickened borders, gen. crisped; cells green or pale yellow: the middle oval-quadrate, the upper small dusky; basal cells large, the alar rectangular; hairpoint short or none. Capsule oval-oblong; annulus broad; pedicel deflexed. Tufts soft us. tomentose, green or blackish, often somewhat high. In open places the leaves not are distinctly crisped. — Rocks princ. in crevices in alp. region r. *Eur.* Norway, Switzerl.! Sweden: E. Adlerz; J. Persson (fruit.). Germany: Schimper. *Amer.* Can. Brit. Col.: Macoun. U. S. Oregon: Roell.

24. *G. hamulosa* Lesquereux.

Differs from the last: Leaves falcate muticous not thickened at borders; cells brown, the lower less elongate; costa brown, stouter and subexcurrent. Tufts loose blackish. »Capsule larger; annulus none»: Lesq. et Jam. — Higher alp. region r. *Amer.* U. S. Calif.: Bolander, com. C. Mueller.

25. *G. atrata* Mielichhofer.

Leaves sublinear subobtuse with thickened borders, crisped when dry, patent-erect when moist; cells pale green in younger state: the middle short-rectangular, the upper round-quadrate sinuous, the alar subquadrate; costa very stout; hairpoint very short nearly smooth us. wanting. Capsule oblong-cylindric or oval; annulus broad; pedicel straight. Tufts very tomentose, blackish when dry, brown-green when moist, often high. — Alp. region princ. on copper-rusty rocks r. *Eur.* Norway, Spain! Austria: Schimper.

3. Trichophylloideæ.

A. Leaves narrow, not recurved below, nearly flat at borders. Tufts dense and cohering, about 1—2 centim. high. Capsule small not striate.

a. Capsule nearly immersed, scarcely emergent above perichetial leaves; calyptra cucullate. Dioecious.

26. *G. ortholoma* Kindb. revue bryol. 1896.

Leaves long, nearly appressed when dry; nearly all cells sinuous, middle rectangular; hairpoint long nearly smooth. Capsule very small; lid with short conic or oblique beak. Tufts 1—2 c. m. high. Leaves often with brown branched brood-filaments. — *Amer.* r. *Can.* *Brit. Col.*: Macoun.

b. Capsule distinctly emergent, yellowish; calyptra mitriform. Monoecious.

27. *G. apiculata* Hornschuch.

Leaves subobtuse; cells yellow in younger state: middle and upper short sinuous, alar rectangular; hairpoint short smooth. Capsule oval; lid apiculate or mamillate. Tufts about 1 c. m. high. Habit of *G. ovata*. — *Alp.* region r. *Eur.* Norway! Austria: Breidler.

28. *G. Holleri* Molendo.

Differs from the last: Leaves with longer hairpoint; nearly all cells narrow. Capsule oblong with wider mouth; lid with longer beak. Tufts about 2 c. m. high. — Higher alp. region r. *Eur.* Austria: Breidler.

29. *G. arenaria* Hampe. — *G. curvula* Br. et Schimp.

Leaves subacute very narrow sublinear; cells faintly sinuous nearly all short, the lowest rectangular; hairpoint long smooth. Capsule suboval; lid obtuse muticous. Tufts less than 1 centim. high. — Rocks and stone-walls also in alp. region r. *Eur.* Switzerl.! Belgium: Schimper.

B. Leaves more or less recurved. Stem often long.

a. Angular (alar) leaf-cells indistinct or uniseriate. Dioecious. Leaves with obsolete or wanting hairpoint.

30. *G. patens* Dickson. — *Bryum* Dicks.; *Grimmia* Br. eur.

Differs from other species in the at back bilamellate costa of leaves.

Leaves long, recurved below middle at both sides, nearly appressed when dry; nearly all cells us. sinuous, the middle and alar subquadrate or short-rectangular, the inner basal long. Capsule subovate pale brown not striate; lid rostrate. Tufts us. loose and green; stem 5—10 c. m. long, r. shorter. Resembles some species of *Racomitrium*. Not r. fruiting. — Moist quartzose rocks also below alps. *Eur.* not r. Sweden common, Norway, Switzerl., Spain! *Amer.* *Can.*: Drummond; Macoun.

* *G. subsimplex* Kindb. bull. soc. bot. ital. 1895.

Stem nearly simple, 3—4 c. m. high. Leaves less appressed when dry, not recurved below at one side, sometimes with brood-corpuscles; upper cells not sinuous. Capsules unknown. Habit of *G. Hartmani*. — Siliceous alp. rocks r. *Eur.* Switzerl. near Goeschenen!

31. *G. robustifolia* Kindb. — *Racomitrium* Kindb. bull. Torr. club XVII; *R. obscurum* Kindb. in Macoun Canad. musci exsicc.

Leaves long, not recurved above at least at one side, faintly crisped and not appressed when dry; nearly all cells sinuous, the middle rectangular, the upper subquadrate. Capsule small oval, striate or plicate when dry; lid with very short oblique beak. Tufts 3—6 c. m. high, dark green, finally blackish brown. — Rocks in brooks of higher alp. region r. *Amer.* Pacif. distr. Can. 1800—2100 metr. a. s.: Macoun.

b. Angular (alar) leaf-cells pluriseriate and rectangular. Dioecious. Stem gen. not high.

32. *G. trichophylla* Greville.

Leaves long, not distinctly recurved below at one side; middle cells short-rectangular, the upper roundish-quadrate faintly sinuous; hairpoint nearly smooth often long. Capsule oblong costate or rugose. Stem us. 1 c. m. (in Canad. specimens often 2 c. m.) high. Tufts loose greenish. — Rocks. *Eur.* princ. below alps, not r. in southern districts. Switzerl.! Germany: Schimper. France: Husnot. *Amer.* Can. common in Pacif. distr.: Macoun. U. S.: Roell.

33. *G. Muehlenbeckii* Schimper.

Differs from the last: Leaves shorter and broader, nearly appressed when dry; upper cells distinctly sinuous; hairpoint longer and rough. Capsule oval gen. smooth. — Rocks princ. in northern districts. *Eur.* Sweden common, Norway, Switzerl.! *Amer.* r. Can.: Macoun.

34. *G. californica* Sullivan.

Leaves somewhat small, acute, recurved below at both sides, the upper with long faintly rough hairpoint; cells yellow: the middle and upper round quadrate very small, not or faintly sinuous; alar cells short-rectangular. Capsule oval faintly striate; teeth often subpartite. Tufts dense brown 2—3 centim. high. — *Amer.* r. Pacif. distr. Can.: Macoun. U. S.: Bolander, com. C. Mueller.

* **G. Watsoni** Lesquereux et James.

Leaves scarcely hair-pointed. Capsule oval-oblong. — *Amer.*
U. S. Calif.: Lesq. et J.

35. **G. depflata** Kindb. cat. Canad. m.

Leaves somewhat small, gen. obtuse and hairless, r. with obsolete hairpoint, recurved below at both sides; middle cells quadrate, the upper round-quadrate not sinuous. Capsule oval not sulcate, often with oblique beak. Tufts dense dark brown or dark green above, 3—4 c. m. high. — Not much distinct from the last, but approved by C. M. — Dry rocks r. *Amer.* Pacif. distr. Can. Vanc. isl.: Macoun. U. S.: Roell.

c. Angular leaf-cells pluriseriate quadrate. Stem gen. long. Plants robust. Tufts loose.

aa. Monoecious. Capsule costate. Stem about 3—4 c. m. long.
36. **G. decipiens** Schultz. — *Trichostomum* Schultz; *Grimmia* Lindb.; *G. funalis* Br. eur.

Leaves recurved below at both sides, more or less flexuous when dry, the uppermost very long; middle cells rectangular, the upper subquadrate distinctly sinuous; hairpoint us. long and rough. Capsule oval. Perichetial leaves subulate-acuminate. Tufts blackish below, yellowish green or brown above. — Siliceous rocks also below alps. *Eur.* Sweden, Switzerl.!

bb. Dioecious. Capsule not distinctly striate. Stem gen. very long.

37. **G. Hartmani** Schimper.

Leaves long, not distinctly recurved below at one side, more or less flexuous; middle and upper cells roundish-quadrate sinuous, nearly all basal short, the alar not hyaline; hairpoint short rough or wanting, often destructed by brood-corpuscles. Capsule oval. Tufts us. green and 5—10 c. m. high. Very r. fruiting. — Rocks often below alps. *Eur.* not r. Sweden common, Switzerl.! Corsica fruiting: Philibert.

38. **G. arcuatifolia** Kindb. bull. Torr. club XVI.

Leaves long, recurved below at both sides, distinctly falcate when moist, not flexuous when dry; middle cells rectangular, upper subquadrate not sinuous. Upper leaves gradually larger upwards; hairpoint short rough. Capsules unknown. Tufts dark green above, about 5 c. m. high. — Dry rocks r. *Amer.* Can., Vanc. isl.: Macoun.

39. **G. canadensis** Kindb. n. sp.

Leaves somewhat long, recurved below at both sides, flexuous when dry; middle cells rectangular, the upper subquadrate

distinctly sinuous, the alar hyaline very numerous. Capsule small oval. Tufts yellowish or brownish green, 4—5 c. m. high. Branches curved. — *Amer. r. Can. Vanc. isl.: Macoun.* 40. ***G. procera*** Kindb. (in litt. ad Macoun 1892); revue bryol. 1896. — *G. pachyphylla* Leiberg bull. Torr. club 1893 ?

Leaves long, recurved nearly all around, nearly appressed when dry; cells yellow, the upper short and not or faintly sinuous, the alar few, the inner basal long; hairpoint short and rough, sometimes wanting. Tufts brownish. Stem 5—10 c. m. long. Habit of *G. patens*. — *Amer. r. Can. Vanc. isl.: Macoun. (U. S.: Leiberg ?)*

4. *Ovatæformes*.

A. Tufts cohering, us. pulvinate. Stem 1—2 c. m. high. Gen. monoecious, us. fruiting.

41. ***G. ovata*** Weber et Mohr. — *G. ovalis* Lindb.

Lower leaves small, the upper ovate-lanceolate, recurved below at one side, nearly appressed when dry; middle and upper cells short indistinctly sinuous, the alar quadrate or short-rectangular; hairpoint us. long and nearly smooth, sometimes wanting. Capsule brown oblong-oval; lid rostellate; annulus deciduous; calyptra us. mitriform. Tufts us. greenish. Monoecious. — Rocks also below alps. *Eur.* common in northern districts. Sweden, Norway, Switzerl.! *Amer. Can.: Macoun.*

* ***G. Hausmanni*** Notaris.

»Leaves muticous. Capsule with apiculate or obtuse lid. Tufts brown-green. — *Eur. Austria»: Limpricht.*

42. ***G. sessitana*** Notaris.

Differs from *G. ovata*: Leaves nearly uniform; hairpoint short. Capsule pale-brown; pedicel less elongate; lid not rostellate; annulus indistinct; calyptra cucullate. Tufts blackish. Dioecious. — Rocks also below alps r. *Eur. Norway, Switzerl.: Italy: Levier.*

43. ***G. Donii*** Smith.

Leaves not long, not recurved at base; upper cells subquadrate sinuous, middle short-rectangular, the alar and the very narrow (inner) basal longer; hairpoint long nearly smooth. Capsule oval pale-yellow; lid mamillate; calyptra us. mitriform; pedicel not or scarcely emergent above perichetial leaves. Tufts small dusky or blackish green, us. about 1 c. m. high or lower. Monoecious. — Alp. regions. *Eur. gen. r. Norway! Amer. r. Can.: Macoun.*

44. *G. microtricha* C. M. et Kindb. l. c.

Differs from the last: Leaves with short hairpoint and shorter, less distinctly sinuous cells. Capsule oblong brown; lid short-conic; pedicel distinctly exserted. Dioecious or (on distinct branches) monoecious. Tufts blackish below. — Subalp. region r. *Amer. Can. Brit. Col.: Macoun.*

B. Tufts not or loosely cohering, 3—8 c. m. high. Gen. dioecious r. fruiting.

a. Leaves sublinear subobtuse, appressed when dry; lower cells not sinuous; hairpoint us. indistinct.

45. *G. elongata* Kaulfuss.

Leaves somewhat *s'*ort and short-acuminate, faintly recurved below at one side; cells yellow in younger state: upper round-quadrate sinuous, middle and alar short-rectangular; hairpoint short often wanting. Capsule oval pale brown; lid short-conic obtuse. Tufts blackish when dry, brown-green when moist, somewhat low and more cohering in fruiting state. — Alp. region r. *Eur. Norway! Austria: Venturi. Amer. Can.: Macoun.*

b. Leaves ovate-lanceolate acute, nearly appressed when dry; nearly all cells (exc. at base near costa) sinuous. Upper leaves with short hairpoint.

46. *G. microcarpa* Gmelin. — *Bryum* Gm.; *Grimmia* Lindb.; *Racomitrium sudeticum* Br. eur.

Leaves more or less recurved below; upper and middle cells short, the alar uniseriate quadrate more dilated. Capsule sub-oval small; lid rostrate. Perichetial leaves with sublinear acumen. Tufts blackish or dark brown when dry. — Moist alp. rocks gen. r. *Eur. Norway, Spain! Amer. Can. Brit. Col.: Macoun.*

47. *G. attenuata* C. M. et Kindb. — *Racomitrium* C. M. et Kindb. l. c.

Leaves recurved nearly all around, suberect and nearly straight when moist; upper cells short, the middle rectangular, the alar long narrow often pluriseriate. Capsule suboval; lid subobtuse or apiculate. Tufts fuscous green above, blackish below. Habit of *G. elatior*. — Alp. region r. *Amer. Can. Brit. Col.: Macoun.*

c. Leaves sublinear acute appressed when dry; lower basal cells not sinuous; hairpoint of upper leaves long. Dioecious. Capsules unknown.

48. *G. Stirtoni* Schimper; Braithwaite.

Leaves not recurved; lower basal cells rectangular, the others small subquadrate. — Rocks r. *Eur.* »Scotl.»: Braithwaite.

5. Unicoloriformes.

A. Lower leaf-cells very sinuous.

49. *G. elliptica* Turner. — *Dicranum* Turn.; *Grimmia* Arnott; *Racomitrium* Br. eur.

Leaves broadly ovate-lanceolate obtuse muticous, nearly appressed when dry; lower cells narrow, upper small dusky. Capsule broad-oval; lid long-rostrate; calyptra mitriform; pedicel straight. Tufts loose blackish when dry, not high. — Damp schistose rocks princ. near Atlantic sea r. *Eur.* Norway: R. Hartman; F. Kiær; E. Nyman.

B. Lower leaf-cells not sinuous.

a. Leaves obtuse muticous. Pedicel straight. Tufts loose.

50. *G. unicolor* Hooker.

Leaves often faintly crisped when dry; cells faintly sinuous, nearly all short yellow, uppermost opaque very small. Capsule brown oval-oblong; lid rostellate; calyptra us. mitriform. Tufts about 4 c. m. or higher, blackish or brown-green when dry. R. fruiting. — Wet rocks often near cascades princ. in alps. *Eur.* less r. Norway, Switzerl. *Amer.* r. Can.: Macoun.

b. Leaves acute with often long hairpoint. Pedicel arcuate. Tufts densely cohering.

51. *G. Olneyi* Sullivant icon. muscor.

Leaves appressed when dry, upper very long; cells greenish: inner basal rectangular, alar quadrate, middle less distinctly sinuous, upper opaque very small. Capsule brown oval; lid rostrate; calyptra cucullate; pedicel short not emergent; annulus revoluble. Tufts 2—3 c. m. high us. grayish green. — *Amer.* r. Can.: Macoun. U. S.: Sullivant et Lesq., com. C. Mueller.

52. *G. Austini* Kindb. revue bryol. 1894.

Differs from the last: Leaves longer and subflexuous, less appressed when dry; middle cells distinctly sinuous. Pedicel longer; calyptra mitriform. — *Amer.* r. U. S. New Jersey: Austin, com. Macoun.

53. *G. fragilis* Schimper syn. ed. 2.

Leaves brittle nearly appressed; nearly all cells short: basal short-rectangular larger, alar rectangular hyaline, middle quadrate sinuous, upper opaque very small; hairpoint rough, in uppermost leaves long. Capsule pale brown small oblong; lid obliquely rostellate; calyptra unknown; pedicel short but emer-

gent. Tufts fuscous about 1 c. m. high. — Granitic blocks in subalp. region r. *Eur.* Portugal; E. Levier.

IV. Pseudo-Schistidium Kindb.

1. Piliferæ.

54. **G. pilifera** Palisot de Beauvois; C. M. — *Weisia* Roehling; *Grimmia pennsylvanica* Sulliv. icon. musc.

Leaves long ovate-lanceolate acute, not appressed but faintly flexuous when dry; upper cells subquadrate sinuous, the others rectangular exc. the subquadrate alar; hairpoint brown below, not long. Capsule oval; lid rostrate; calyptra mitriform; pedicel straight; annulus broad revoluble. Tufts loose brown about 2 c. m. high. — *Amer. Can.*: Drummond n. 56, com. Macoun. U. S.: Austin, com. Macoun; Sullivant, com. C. Mueller.

2. Crinitæ.

A. Annulus of capsule broad revoluble; peristome present.

a. Leaves short obtusate obtuse concave; cells sinuous. Capsule red-brown, rugose when dry; pedicel curved; calyptra cucullate. Monoecious.

55. **G. crinita** Bridel.

Leaves not thickened at borders: lower sublong, upper obovate-oblong larger; upper cells quadrate, middle short-rectangular, lower long hyaline; hairpoint long. Capsule ovate; lid short-conic. Tufts grayish loosely cohering, 1 c. m. or lower. — Stone-walls. *Eur.* princ. in southern districts. Switzerl.! France: Zetterstedt. Austria: Schmidt.

b. Leaves somewhat long-acuminate acute carinate above; cells sinuous. Capsule pale yellow not rugose; pedicel straight; calyptra mitriform. Monoecious.

56. **G. triformis** Carestia et Notaris.

Lower leaves small; upper larger and broadly ovate-lanceolate, not appressed when dry, us. curved when moistened; cells yellowish small quadrate exc. the rectangular lower basal, alar hyaline numerous; hairpoint nearly smooth, in upper leaves long. Capsule subglobose-cyathiform; lid convex mamillate. Tufts green 1—2 c. m. high. — In alps r. *Eur.* Switzerl.! Italy: Carestia, com. Geheeb.

57. **G. Ganderi** Limpricht.

Differs from the last: Leaves longer acuminate, not curved when moistened; upper cells oval-oblong; hairpoint long. Lid of capsule short-conic. — Schistose alp. rocks r. — *Eur.* Austria: Gander, com. E. Adlerz.

c. Leaves gen. long-acuminate, sometimes papillose near apex; cells not sinuous. Pedicel of capsule straight. Dioecious. 58. **G. tergestina** Tommasini.

Leaves with thickened borders, ovate-lanceolate somewhat large: upper with long faintly denticulate hairpoint; basal cells narrow-rectangular, the others short; costa not dilated above. Capsule brown suboval; lid rostellate. Tufts pulvinate often 2—3 c. m. high, grayish when dry. — Calcareous rocks and stones r. *Eur.* southern distr. Switzerl.! Austria: Schimper; Roell. Italy: Bottini. France: Philibert.

B. Leaves smooth gen. obtusate: lower obtuse muticous. Pedicel of capsule curved; annulus narrow persistent. Monoeious.

a. Peristome present.

59. **G. plagiopodia** Hedwig.

Upper leaves oblong with nearly smooth not long hairpoint; cells not sinuous, gen. short, basal larger. Capsule pale brown subglobose or broad-oval; lid nearly flat or subconvex, mamillate or apiculate; teeth orange. Tufts green or brown-green not cohering, scarcely 1 c. m. high. — Dry rocks princ. of sandstone. *Eur.* less r. in southern distr. Germany: Schimper; Schulze. France: Husnot m. gall. *Amer.* r. Can.: Macoun.

* **G. Brandegei** Austin.

Perichetial leaves hyaline above often to middle; hairpoint rough very long. Capsule subglobose; pedicel very short. — *Amer.* r. Can.: Macoun.

b. Peristome us. warting.

60. **G. anodon** Bryol. *eur.*

Upper leaves narrowly ovate-oblong acute with long nearly smooth hairpoint; cells not sinuous: basal narrow-rectangular, the others short; costa broader above. Capsule red-yellow broad-oval, finally subpomiform; lid low subconvex mamillate or apiculate; peristome none. Perichetial leaves larger and longer; basal cells very long. Tufts not or loosely cohering grayish green about 1 c. m. high. — Dry rocks also in alps. *Eur.* less r. Norway! Germany: Schimper. Austria: Venturi. *Amer.* r. Can.: Macoun.

61. **G. alpina** Kindb. enum. bryin. dovr.; revue bryol. 1896. — »G. plagiopodia»: Zetterstedt; »G. anodon»: Limpricht; G. Limprichtii Kern.

Differs from the last: Leaves broader, ovate or broadly ovate-oblong obtuse without hairpoint; cells often sinuous gen. sub-

quadrate. Lid of capsule convex neither apiculate nor mamillate; teeth sometimes rudimentary. Perichetial leaves with somewhat long hairpoint; basal cells short-rectangular. Tufts cohering brown-green about 2 c. m. high. — Rocks in higher subalp. region r. *Eur.* Norway in Dovrefjeld! Austria: Kern.

V. *Schistidium* Bridel.

1. *Platyphylloideæ*.

A. Leaves not appressed when dry; hairpoint wanting.

a. Leaves denticulate near the obtuse apex, broadly acuminate.

62. *G. rivularis* Bridel.

Leaves large ovate-lanceolate, cells large. Perichetial leaves broadly obtusate; costa abbreviate. Capsule obovate finally turbinate; teeth red, larger than in *G. apocarpa*; lid short-pointed; calyptra cucullate. Tufts loose. Stem decumbent, 3—6 c. m. or longer. — Stones in water not common. *Eur.* Finl.: Brotherus. France: Husnot. *Amer. Can.*: Macoun.

b. Leaves entire nearly subulate.

63. *G. maritima* Turner.

Leaves ovate-lanceolate recurved crowded us. crisped when dry; the upper with us. excurrent costa. Capsule as in the last; teeth orange; lid rostellate; calyptra us. cucullate. Tufts dense pulvinate 1—2 c. m. high. — Rocks near sea or larger lakes. *Eur.* not r. Sweden! Ireland: Schimper. France: Le Jolis. *Amer. Can.*: Macoun; Roell; Waghorne.

* *G. Agassizii* Sulliv. et Lesq. — *Schistidium* S. L.; *Grimmia* Lq. et J.; *G. crassinervis* C. M.

Leaves less crisped; costa not or indistinctly excurrent. Lid of capsule sometimes with shorter point. — *Amer. Can.*: J. Macoun; Waghorne. Alaska: J. M. Macoun.

64. *G. cinclidodonta* C. Mueller

Leaves narrowly ovate-lanceolate not recurved, loosely disposed, falcate when moistened; costa long-excurrent. »Capsule subglobose; teeth red; lid rostellate; calyptra mitriform«: C. M. Tufts not cohering; stem about 4—5 c. m. long. — *Amer. r.* Pacif. distr. U. S.: Roell, com. C. Mueller.

B. Leaves entire nearly or completely appressed when dry, often with hairpoint. Stem erect.

a. Stem-leaves short obtuse ovate or ovate-oblong.

65. *G. platyphylla* Mitten.

Leaves subovate muticous more or less recurved and not large, appressed when dry, not curved when moistened; peri-

chetial not much larger. Capsule subglobose; teeth red; lid short-pointed or mamillate; calyptra cucullate. Tufts 1—3 c. m. high, somewhat loose us. green. — Alp. rivulets r. *Eur.* Norway! *Amer. Can.*: Macoun.

66. *G. brunnescens* Limpricht. — *Schistidium* Lpr.; *Grimmia* Kindb.

Leaves small ovate-oblong muticous or with short rough hairpoint, not recurved, nearly appressed when dry, curved when moistened; perichetial not much larger with longer hairpoint. Capsule subglobose or broad-oval; teeth orange; lid short-pointed; calyptra mitriform. Tufts dense 1—1.5 c. m. high. — Higher subalp. region r. *Eur.* Switzerl.

b. Stem-leaves ovate-lanceolate. Tufts dense.

67. *G. flaccida* Notaris. — *Anoetangium* Not.; *Grimmia* Lindb.; *G. sphaerica* Schimper; *Gymnostomum pulvinatum* Hoffmann 1796.

Leaves somewhat large acuminate, recurved only in middle, with nearly smooth often long hairpoint; perichetial larger and more recurved. Capsule subglobose finally turbinate; teeth orange often rudimentary or wanting; lid mamillate; calyptra mitriform. Tufts 0.5—1.5 c. m. high often green. — Rocks and stone-walls r. *Eur.* Switzerl., Italy! Austria; Breidler.

68. *G. alpicola* Swartz.

Leaves not large, broadly acuminate subobtusate and recurved, muticous or with indistinct hairpoint; perichetial not much larger. Capsule suboblong often nearly exserted; teeth red; lid short-pointed; calyptra cucullate. Tufts 1—5 c. m. high us. brown or brown-green. — Moist alp. rocks r. *Eur.* Switzerl., Norway! *Amer. Can.*: Macoun.

69. *G. heterophylla* Kindb. bull. Torr. club XVII. — *G. coscinodontoides* Kindb. l. c.; *G. chloroblasta* Kindb. cat. Canad. m.

Leaves small narrowly acuminate nearly subulate, not distinctly recurved, with an often long rough hairpoint; perichetial green larger and longer. Capsule oblong; teeth orange very eribrose. Tufts 1—1.5 c. m. high dark green or grayish when dry. — Alp. rocks r. *Amer. Can.* Brit. Col.: Macoun.

2. *Apocarpæformes*.

A. Leaves princ. the youngest serrulate above often to middle; cells sinuous; costa rough at back.

70. *G. gracilis* Schleicher.

Leaves not large, ovate-lanceolate broadly acuminate recurved, nearly appressed when dry, curved when moistened; perichetial larger; hairpoint rough often long. Capsule oblong; teeth fer-

rusty below, pale yellow above; lid reticulate; calyptra cucullate or mitriform. Tufts loose often pale brown. Stem 2—10 c. m. long, sometimes decumbent. — Rocks also in alps not r. *Eur.* Norway, Sweden, Switzerl.! France: Husnot m. gall. *Amer.* Can.: Drummond; Macoun; Waghorne. U. S.: Austin. 71. *G. pseudo-rivularis* Kindb. n. sp.

Differs from the last: Leaves larger and broader, narrowed to a short-subulate point, patent when dry; cells less sinuous; costa subexcurrens rough only in upper part. Capsule oval; teeth red; calyptra mitriform. Stem long decumbent. Tufts green. — *Amer.* r. Can.: Macoun.

* *G. lancifolia* Kindb. n. subsp. — *G. coloradensis* Austin ?

Leaves narrower and less acute sometimes with obsolete rough hairpoint; costa not excurrens. Stem not long. — Wet rocks r. *Amer.* Can.: Macoun.

B. Leaves entire or near apex faintly serrulate, us. curved when moistened; costa smooth or near apex faintly rough. Stem us. erect.

a. Leaves recurved, the perichetial much longer.

72. *G. apocarpa* L. — *Bryum* L.; *Grimmia* Hedwig.

Leaves broadly acuminate us. ovate-lanceolate and not appressed when dry, gen. with rough hairpoint; cells us. papillose and faintly sinuous. Capsule suboval; teeth red; lid reticulate; calyptra mitriform. Tufts us. loose. — Rocks also in alps common. *Eur.* Sweden, Norway, Switzerl.! *Amer.* Can.: Macoun; Waghorne.

* *G. pachyneurula* C. M. et Kindb. l. c.

Leaves small mucous; cells smooth thin-walled not sinuous. — *Amer.* Can. Brit. Col.: Macoun.

73. *G. pruinosa* Wilson. — *G. ambigua* Sulliv. icon. m.

Leaves small broadly ovate-lanceolate subobtusely mucous or with rough often short hairpoint, appressed when dry; cells sinuous. Capsule suboval; pedicel sometimes as long; teeth reddish or paler; lid short-pointed; calyptra cucullate. Tufts loose about 1 c. m. high. In alps r. *Eur.* Norway; Bryhn. Sweden: E. Nyman. *Amer.* Can.: Macoun; Waghorne. U. S.: Fendler, com. C. Mueller.

74. *G. atrofusca* Schimper.

Leaves small short ovate or oval-oblong us. mucous, appressed when dry; cells not sinuous. Capsule suboval; teeth reddish orange short and not perfectly evolute; lid reticulate; calyptra mitriform. Tufts loosely cohering about 2 c. m. high.

blackish when dry. — Higher alp. region princ. on summits r.
Eur. Switzerl. 1700 metr. a. s.!

b. Leaves not recurved; the perichetial much larger.

75. **G. atricha** C. M. et Kindb. l. c.

Leaves small short ovate-oblong subobtusely mucous, appressed when dry. Capsule suboblong; teeth yellow or hyaline above, orange near base; lid rostrate. Tufts densely cohering about 1 c. m. high, dark green or fuscous when dry. — Alpine rocks r. *Amer. Can. Brit. Col.* 1250 metr. a. s.: Macoun.

c. Leaves recurved; the perichetial not much larger.

76. **G. conferta** Funck.

Leaves broadly ovate-lanceolate subacute smooth not large, often with rough hairpoint, us. appressed when dry; cells not distinctly sinuous. Capsule oblong-oval; teeth orange; lid apiculate; calyptra mitriform. Tufts dense but loosely cohering, 1—2 c. m. high, fuscous when dry. — Rocks not common. *Eur.* Sweden!; Lindberg. Switzerl. *Amer. Can.:* Macoun; Waghorne.

* **G. tenera** Zetterstedt.

Leaves very small sublinear nearly subulate, nearly spirally twisted when dry; cells smaller. Capsules unknown. — Arctic distr. r. Norway: J. E. Zetterstedt, com. C. J. E. Haglund; W. Baur.

103. **Racomitrium** Bridel.

A. Leaves with papillose hyaline hairpoint or acumen. Beak of calyptra rough above.

1. **Lanuginosa.** Leaves fimbriate at acumen; green cells smooth. Capsule longer than beak; pedicel rough.

2. **Canescentia.** Leaves serrulate at acumen; all cells us. with somewhat long papillæ. Capsule gen. not longer than beak; pedicel smooth.

B. Leaves hairless or with a serrulate not papillose hairpoint. Capsule gen. longer than beak; pedicel smooth. Beak of calyptra sometimes wholly rough (viz. in *R. fasciculare*).

3. **Papillosa.** Leaves with short papillæ, often hairless.

4. **Lævifolia.** Leaves smooth us. with long hairpoint.

1. **Lanuginosa.**

1. **R. hypnoides** L.; Willdenow. — *Bryum* L.; *Trichostomum* Willd.; *Racomitrium* Lindb.; *R. lanuginosum* Bridel.

Leaves long ovate-lanceolate recurved below; green cells gen. narrow, the alar rectangular; costa smooth. Pedicel short. Stem ramose often to 10 c. m. long. — Stone and stony ground also

in alps, common in northern districts. *Eur.* Sweden, Norway!
Amer. Can.: J. Macoun; Waghorne. *Alaska:* J. M. Macoun.

2. *Canescentia*.

2.R.canescens Weis. — *Hypnum* Weis; *Racomitrium* Brid.

Leaves from broad ovate-oblong base gen. abruptly tapering to a subacute acumen, recurved nearly all around; upper and alar cells subquadrate, the others rectangular; costa rough at back, us. abbreviate; hairpoint r. short or indistinct. Pedicel us. long. — Stone ground also in alps common. *Eur.* Sweden, Norway, Switzerl. *Amer. Can.:* J. Macoun; Waghorne. *Alaska:* J. M. Macoun. *U. S.:* Roell.

* **R.subfasciculare** Kindb. n. subsp.

Leaves fainter papillose, muticous or with very short hairpoint. — Rocks princ. in alp. region *Eur.* Norway! *Austria:* Venturi.

* **R.muticum** Kindb. bull. Torr. club XVII.

Leaves fainter papillose muticous, finally yellowish brown; costa percurrent. — Alp. region r. *Amer. Can. Brit. Col.* 1950 metr. a. sea: Macoun.

3.R.Panschii C. Mueller. — *Grimmia* C. M.; *Racomitrium* Kindb.

Differs from *R. canescens*: Leaves subovate obtuse with very short acumen without hairpoint or only faintly hyaline at apex, faintly papillose. Tufts low blackish. Capsules unknown. — Stem without nodose branches. — Arctic district r. *Amer. Greenl. isl. Sabine:* Pansch, com. C. Mueller.

3. *Papillosa*.

A. Leaves very broadly acuminate or obtusate, arrounded at the us. dentate apex, short broad and channelled, without hairpoint; costa not percurrent. Stem without nodose branchlets.

4.R.aciculare L. — *Bryum* L.; *Racomitrium* Bridel.

Leaves us. green or blackish when dry; upper cells rotundate. Capsule suboval; teeth deeply cleft; pedicel somewhat long. — Wet stones also in alps. *Eur.* nearly common. Sweden, Switzerl., Spain! *Amer. Can.:* J. Macoun; Waghorne. *Alaska:* J. M. Macoun.

5.R.Neevii C. Mueller.

Leaves us. bright green also when dry; upper cells subquadrate. Capsule oval-oblong; pedicel short. — Wet rocks r. *Amer. Can. princ. in Pacif. distr.:* J. Macoun. *Alaska:* J. M. Macoun.

B. Leaves narrowly acuminate entire.

a. Capsule large subcylindric; pedicel about 2 c. m. long.

Leaves long gradually acuminate acute or subacute carinate, often with hairpoint; costa gen. percurrent. Stem r. with short nodose branchlets.

6. *R. varium* Mitten. — *R. oreganum* Ren. et Card.

Leaves yellowish green recurved nearly all around, subacute at apex, not appressed when dry; cells also the upper rectangular; costa greenish; hairpoint not long. Peristomial teeth partite. Stem sometimes with short r. numerous branchlets.

— Wet stones in woods r. *Amer.* Pacif. distr. Can.: Macoun. U. S.: Henderson, com. Cardot.

7. *R. speciosum* C. Mueller.

Leaves green recurved nearly all around, subacute at apex; upper cells gen. subquadrate, often greenish; hairpoint often long. Peristomial teeth partite. Stem without short branchlets; leaves more appressed than in the resembling last. — Rocks in woods r. *Amer.* Pacif. distr. Can.: Macoun; Roell, com. C. Mueller.

8. *R. Levieri* Kindb. n. sp.

Leaves dark green or finally blackish brown, acute at apex, not recurved above or at one side, appressed when dry; upper cells subquadrate, the lower rectangular; costa finally brown; hairpoint none. Perichetial leaves more or less acuminate; costa percurrent or slightly excurrent. Peristomial teeth deeply cleft not partite. Stem without short branchlets. Tufts blackish brown when dry. — Alp. granitic rocks r. *Eur.* Portugal: E. Levier.

b. Capsule small gen. suboval; pedicel about 1 c. m. or shorter. Leaves gen. without hairpoint us. carinate.

aa. Leaves not recurved above or at one side, obtuse or subobtuse at apex; upper cells subquadrate; hairpoint none or indistinct. Peristomial teeth deeply cleft not partite. Stem without nodose branchlets.

9. *R. protensum* Braun. — *Trichostomum* Braun; *Racomitrium* Huebener.

Leaves somewhat long and at apex obtuse, recurved below, appressed when dry; hairpoint none; costa finally brown not percurrent. Perichetial leaves short-acuminate; costa short. Capsule suboval exserted; pedicel 5—8 mm. long. Tufts dark green finally blackish brown. — Wet rocks. *Eur.* not r. Sweden, Switzerl. Portugal: Levier. *Amer.* »Greenl.«: Lange.

10. *R. depressum* Lesquereux.

»Resembling the last. Leaves broadly ovate, lanceolate above, obtuse, sometimes slightly denticulate at apex; upper cells broadly ovate. Capsule subcylindric immersed on a very short pedicel. Stem very long. — *Amer. r. U. S.: Calif.: Bolander*: Lesq. et Jam.

11. *R. Macounii* Kindb. bull. Torr. club XVI.

Leaves long, subobtuse at apex, not recurved at base, crisped when dry; hairpoint none or indistinct; costa percurrent finally brown. Capsule suboval exserted; pedicel 0,5 c. m. long. Tufts finally rusty or reddish brown. — Rocks and boulders in alp. region r. *Amer. Can. Brit. Col. 2100 metr. a. sea: J. Macoun.*

bb. Leaves recurved nearly all around, long and acute; cells us. narrow. Peristomial teeth partite. Stem often with short nodose branchlets.

12. *R. fasciculare* Schrader. — *Bryum* Schr.; *Racomitrium* Brid.

Leaves nearly subulate-acuminate carinate us. (at least the upper) greenish; cells narrow; costa subpercurrent; hairpoint none. Stem with numerous short branchlets, us. long. Pedicel about 1 c. m. or shorter. Calyptra with wholly rough beak. — Rocks also in alps. *Eur.* not uncommon. Sweden, Norway, Switzerl., Spain! *Amer. Can.: J. Macoun; Waghorne. Alaska: J. M. Macoun.*

13. *R. tenuinerve* Kindb. revue bryol. 1896.

Leaves longer subulate than in the last, carinate, yellowish green; cells narrow; costa faint vanishing far below apex; hairpoint none. Stem long sometimes without short branchlets. Pedicel 0,5 c. m. long. Calyptra not seen. — Rocks r. *Amer. Pacif. distr. Can.: J. Macoun. Alaska: J. M. Macoun.*

14. *R. Palmeri* Kindb. revue bryol. 1896.

Leaves longer subulate than in *R. fasciculare*, blackish when dry, the upper faintly crisped; cells narrow; costa percurrent or subexcurrent; hairpoint none. Tufts dense 2—3 c. m. high. Pedicel very short gen. immersed. Habit of *Grimmia microcarpa*. Arctic district t. *Amer. Alaska: Palmer; J. M. Macoun.*

15. *R. Jensenii* Kindb. l. c. — *R. sudeticum* var. *papillosum* Jensen.

Leaves small broadly ovate-lanceolate acute, blackish and appressed when dry; the upper with short hairpoint; upper cells short; costa brown percurrent papillose. Capsules unknown. Tufts dense and low. Habit of *Grimmia microcarpa*. — Arctic district t. *Amer. Greenl.; P. Eberlin, comp. C. Jensen.*

16. *R. micropus* Kindb. cat. Canad. m. — *R. heterostichum* var. *occidentale* Renaud et Cardot.

Leaves long-acuminate greenish channelled with thick borders; cells yellow gen. narrow, the uppermost sometimes subquadrate; costa percurrent; hairpoint long. Capsule oblong cylindric with short oblique beak; pedicel about 0.5 c. m. long. Habit of *R. microcarpum*. — Granite rocks in alp. region r. Amer. Pacif. distr. Can. Brit. Col. 2000 metr. a. sea: Macoun. U. S.: Roell; Henderson, com. Cardot.

4. *Lævifolia*.

A. Leaves channelled, thickened at upper borders.

17. *R. affine* Schleicher. — *Trichostomum* Schl.; *Racomitrium* Lindb.

Leaves ovate-lanceolate recurved below; upper cells round-quadrate not or indistinctly sinuous; hairpoint short. Capsule suboblong; teeth partite; pedicel about 1 c. m. long. Tufts gen. not high and often dense. Stem often without short branchlets. — Siliceous rocks not common. Eur. Norway, Switzerl. Sweden: Arnell. Amer. Can.: Macoun; Waghorne. U. S.: Roell.

* ***R. obtusum*** Smith. — *Trichostomum* Sm.; *Racomitrium* Lindb.

Leaves gen. obtuse without hairpoint. — Eur. Sweden: Arnell. Norway: Bryhn. Amer. Can.: Macoun.

B. Leaves carinate above with not thickened borders.

18. *R. heterostichum* Hedwig. — *Trichostomum* H.; *Racomitrium* Brid.

Leaves ovate-lanceolate acuminate recurved nearly all around; cells as in the last; hairpoint often long. Capsule oblong-cylindric often somewhat large; teeth partite; pedicel 1 c. m. or somewhat longer. Tufts us. grayish. Stem often with short branchlets. — Quartzose stone princ. below alps. Eur. common. Sweden, Norway, Switzerl. Amer. Can.: J. Macoun. Alaska: J. M. Macoun. U. S.: Henderson, com. Cardot.

* ***R. micropoides*** Kindb. n. subsp.

Leaves pellucid with very short hairpoint; upper cells sometimes rectangular; alar cells hyaline. Capsule small scarcely shorter than pedicel. — Rocks in alp. region r. Amer. Pacif. distr. Can. Brit. Col.: Macoun. U. S.: Roell.

19. *R. microcarpum* Schrader. — *Dicranum* Schr.; *Racomitrium* Brid.

Leaves as in the last; cells narrow-rectangular distinctly sinuous. Capsule small gen. suboval; teeth partite; pedicel short.

Stem with short branchlets. Tufts us. green. — Dry rocks princ. in northern alps. *Eur.* Sweden common, Norway, Switzerland. *Amer. Can.:* Drummond; Macoun; Waghorne.

104. *Campylostelium* Bryol. eur.

1. *C. saxicola* Weber et Mohr. — *Dicranum* W. M.; *Campylostelium* Br. eur.

Leaves from suboblong base tapering to the longer but not much narrower sublinear obtusate acumen, crisped when dry; lower basal cells large rectangular, the others small quadrate; costa narrow not excurrent. Capsule oblong-cylindric; teeth red-yellow long narrow; lid long-rostrate; calyptra lobate; pedicel yellow sometimes curved. Stem very short. Monoecious with yellow male flowers at base of stem. — Rocks princ. of sandstone, often together with *Brachydontium*, r. *Eur.* Engl. W. H. Pearson. *Amer. Can.:* Macoun.

* *C. strictum* Solms Laubach.

Pedicel finally red. »Sometimes synoecious»: Geheeb. Otherwise not differing. — *Eur.* r. Portugal: Newton, com. Le Jolis.

105. *Coscinodon* Sprengel.

A. Leaves more or less distinctly plicate above. Dioecious. 1. *C. cribrus* Hedwig. — *Grimmia* H.; *Coscinodon* Spruce.

Leaves broadly ovate-lanceolate or from subovate concave base slightly tapering to the involute scarcely longer gen. obtuse acumen, not recurved; alar cells not defined, the other basal short-rectangular pellucid, the upper subquadrate somewhat dusky; costa not excurrent. Perichetial leaves very much larger, more plicate, shorter-acuminate; hairpoint long, at base very broad. Capsule half-emergent obovate finally inclined, orange not striate; teeth orange cribose (perforated as a sieve as in the other species), deflexed or patent when dry. Tufts compact loosely cohering about 1 c. m. high. Habit of *Grimmia crinita*. — Schistose and siliceous rocks. *Eur.* not r. Norway, Switzerland. *Amer.* r. Can.: Macoun.

* *C. humilis* Milde.

Leaves somewhat narrower r. or slightly plicate; hairpoint more rough. — Peristomial teeth sometimes less perforated. *Eur.* r. France, Switzerland.

B. Leaves not plicate. Monoecious.

2. *C. Wrightii* Sullivant icon. muscor.

Leaves very concave from subovate base abruptly narrowed subobtusate, often crenulate above, sometimes reflexed below, appressed when dry, erect when moist; cells short-rectangular:

basal larger, apical hyaline; costa excurrent to a very long rough hairpoint. Perichetial leaves not larger. Capsule immersed suboval, truncate at base; pedicel shorter; teeth purplish. Stem very short. — Rocks r. *Amer.* »U. S. south. states»: Lesq. et Jam.

3. *C. Rauli* Austin. — C. Renauldi Cardot.

Differs from the last: Leaves carinate narrower more distinctly acuminate not recurved, patent when moist, gen. entire with shorter hairpoint; costa gen. not excurrent. Capsule globose when young, finally oval; teeth sometimes cleft. — *Amer.* r. U. S.: Henry, com. Cardot.

4. *C. calyptratus* Hooker. — *Grimmia* Hook.; Sull. icon. m.; *Coscinodon* C. Jensen (in litt.); *Grimmia columbica* Kindb. bull. Torr. club.

Leaves ovate-lanceolate channelled, recurved below; basal cells subquadrate much larger than the upper; hairpoint long rough; costa percurrent. Perichetial leaves sublinear much longer. Capsule not or scarcely emergent above the hairpoints, oblong-cylindric smooth or slightly striate yellow or orange-colored; lid rostrate or rostellate; annulus none; pedicel straight or r. curved, longer than capsule. Stem 2—3 c. m. long or shorter. Tufts dense glaucous green. — Dry alp. rocks. *Amer.* Can. Pacif. distr.: Macoun. U. S. Calif.: com. Macoun. (Mexico: Fendler, herb. Sulliv., com. C. Mueller).

106. *Brachystelium* Reichenbach; C. M.

A. Perichetial leaves not convolute. Peristomial teeth papillose indistinctly articulate not deflexed.

I. *Ptychomitrium*. Leaves plicate below, serrate above. Peristomial teeth us. subpartite. Plants somewhat robust. Habit of *Orthotrichum* (Ulota).

II. *Notarisia*. Leaves not plicate, entire or slightly sinuate. Peristomial teeth often entire or irregularly cleft. Plants small. Habit of *Weisia*.

B. Perichetial leaves convolute. Peristomial teeth smooth articulate, deflexed when dry.

III. *Glyphomitrium*. Leaves entire not plicate. Plants small.

I. *Ptychomitrium* Bruch.

1. *P. polyphyllum* Dickson. — *Bryum* D.; *Brachystelium* Hornschuch.

Leaves from ovate-oblong subconcave broadly recurved base somewhat abruptly tapering to a long carinate nearly subulate acumen, incurved or nearly straight when moist; outer basal



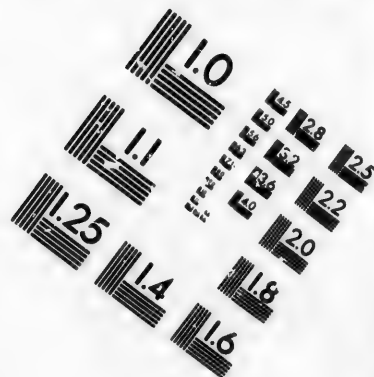
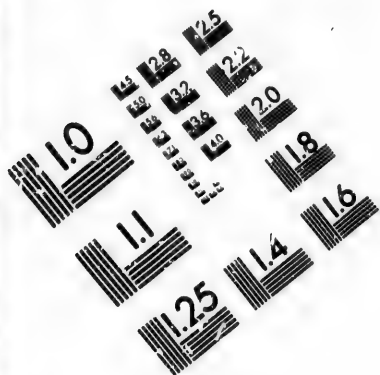
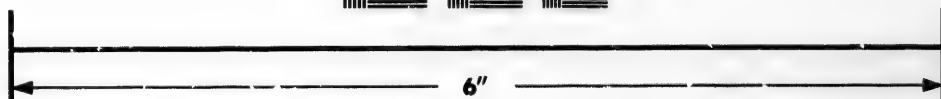
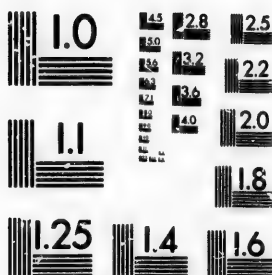


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cells short-rectangular, the inner narrower, the alar brown; costa scarcely percurrent. Capsule oblong; teeth reddish below, yellowish in upper half; pedicel flexuous or arcuate when young and moistened; calyptra not long. Spores about 0,01 m. m. — Rocks and stonewalls. *Eur.* not r. in southern distr. France, Switzerl. Norway: R. Hartman. Spain: Levier.

2. **B. Gardneri** Lesquereux. — *Ptychomitrium* Lq.; *Brachystelium* Kindb.

Differs from the last: Leaves wholly carinate gradually acuminate less distinctly plicate, falcate when moist; outer basal cells subquadrate. Capsule subcylindric; teeth blood-red; pedicel not flexuous. — Rocks r. *Amer.* Pacif. distr. Can.: Macoun. U. S.: Howell and Henderson, com. Cardot.

II. *Notarisia* Hampe.

3. **B. nigricans** Kunze. — *Macromitrium* Kunze; *Brachystelium* Kindb.

Leaves entire not involute, from short concave base contracted to the broad-subulate channelled or near apex carinate acumen, gen. acute; cells of acumen nearly opaque, the marginal basal often subquadrate; other basal cells rectangular also pellucid, the inner not much narrower, the lowest larger often yellowish princ. the alar; costa distinct nearly to apex. Capsule oblong with indistinct neck; pedicel rigid. Spores 0,02 m. m. — Rocks r. *Eur.* Portugal: Solms Laubach, com. Nathorst (Teneriffa, com. Hustot).

* **B. Drummondii** Hooker et Wilson. — *Grimmia* H. W.; *Brachystelium* C. M.; *Ptychomitrium* Sull. ic. m.

Capsule oval. Leaves not reflexed at base, sometimes slightly sinuate near apex. — Trees r. *Amer.* U. S. south. st.: Langlois, com. Cardot.

4. **B. incurvum** Schwægrichen. — *Weisia* Schw.; *Brachystelium* C. M.; *Ptychomitrium* Sull. ic. m.

Leaves entire, from short concave base contracted to the sublinear involute and at borders thickened acumen, gen. obtuse; cells of acumen opaque, the lower basal rectangular hyaline; costa faint above. Capsule oval with short or indistinct neck; pedicel often curved when moistened. Spores about 0,01 m. m. Smaller than the last. — Rocks princ. of sandstone, r. *Amer.* U. S.: Fitzgerald, com. Renauld. »Can.: Macoun»: Lesq. et Jam.

* **B. glyphomitrioides** Balsamo et Notaris. — *Grimmia* B. et N.; *Brachysteleum* C. M.; *Ptychomitrium* pusillum Br. eur.

Leaves more distinctly involute and subeucullate. Peristomial teeth often split. — Rocks r. *Eur.* Switzerl. near Lugano!

5. *B. pygmaeum* Lesq. et Jam. — *Ptychomitrium* L. J.; *Brachystelium* Kindb.

»Leaves linear from ovate base; costa vanishing far below apex. Capsule oval; neck a third as long; teeth joined in pairs at base, sometimes connate their whole length; calyptra covering the capsule to its base. Plants very small. — On stones (?). *Amer.* U. S.: E. Hall.; Lesq. et Jam.

III. *Glyphomitrium* Bridel.

6. *B. Daviesii* Dickson. — *Bryum* Dicks.; *Brachystelium* Kindb.

Leaves narrow sublinear not or slightly reflexed below, from suboblong not well-defined base gradually tapering to a long subulate carinate acumen; nearly all cells quadrate not opaque; only the lowest rectangular not much larger; costa percurrent. Perichetial leaves suboblong apiculate; costa subexcurrent. Capsule subglobose or obovate; neck nearly half as long; teeth broad; calyptra covering capsule; annulus none. Leaves sometimes with brood-filaments. Spores 0,03—0,04 m. m. — Basaltic rocks r. *Eur.* Scotl.: Schimper. Engl.: W. H. Pearson. Irel.: Stewart, com. Le Jolis.

7. *B. canadense* Mitten. — *Glyphomitrium* M.; *Brachystelium* Kindb.

»Leaves lanceolate tapering to an acute or blunt point; borders recurved below to middle; basal cells oblong, the angular narrower. Perichetial leaves very broadly ovate. Capsule oval; pedicel shorter than in the last. — *Amer.* r. Can.: Drummond.; Lesq. et Jam.

107. ***Drummondia*** Hooker, musci amer. 1828.

1. *D. clavellata* Schwægrichen. — *Macromitrium* Schw.; *Drummondia* Hooker.

Leaves suboblong or broadly ovate-lanceolate, acute or very short acuminate, carinate at least above, not distinctly involute; cells small rotundate, the few not well-defined alar subquadrate; costa not wholly percurrent. Perichetial leaves nearly similar but with short-rectangular cells at angles near base. Capsule subglobose-ovoid brown smooth; lid nearly flat, long-rostrate; annulus none; pedicel short. Calyptra long-rostrate reaching below the unripe capsule, finally concave and cucullate. Spores very large about 0,06 m. m. Tufts green or brown green. Dioecious. — On trees. *Amer.* Can. r.: Macoun. U. S.: Roell; Sullivan, com. C. M.; Fitzgerald, com. Renauld.

2.D.canadensis Kindb. revue bryol. 1896. — *D. clavellata* var. *canadensis* Kindb. cat. Canad. m.

Differs from the last: Leaves gen. subobtusely, channelled, distinctly involute at borders all around. Perichetial leaves broader, more obtuse; nearly all cells lax and long-rectangular. Capsule globose a little larger; lid short-rostrate. Tufts sometimes brown. Monoecious. Nearly allied to *D. obtusifolia* C. M. from Chili. — On trees r. Amer. Can. near lake Erie: Macoun.

108. **Scouleria** Hooker.

A. Leaves broad, thinly or indistinctly limbate only below. Peristome gen. persistent at least partly.

1.S.aquatica Hooker. — *Grimmia Scouleri* C. M.

Leaves ovate-lanceolate, broader at base, below middle tapering to the contracted broad point, sharply serrate to it from middle, blackish (or only the uppermost green) and strongly appressed when dry; marginant cells opaque very distinct; other cells gen. dusky thick-walled, exc. few linear not porose inner basal. Inner perichetial leaves shorter and less dusky. Perigonial leaves short suboval very obtuse. — Wet rocks r. Amer. Can.: Macoun. U. S.: Henderson, com. Cardot.

2.S.Muelleri Kindb. cat. Canad. m.

Leaves subelliptic, broader near middle, with very short arched broad point, sharply serrate from it to below middle, olive green and sometimes less strongly appressed when dry; cells subpellucid, the marginant pale orange not well-defined, the linear inner basal numerous porose. Inner perichetial leaves very pellucid from short dilated entire base tapering to a sublinear serrate acumen. — Wet rocks r. Amer. Can. Pacif. distr. Brit. Col. near Revelstok 1890 and Vanc. isl. 1893: Macoun.

* **S.catilliformis** C. Mueller.

Leaves nearly entire; marginant cells dusky. Capsules unknown. — Amer. r. U. S.: Roell, com. C. Mueller.

3.S.Neevii C. Mueller.

Differs from *S. Muelleri*: Leaves obtusely crenulate, patent when dry; upper cells dusky, the lower subpellucid, the marginant opaque, the linear inner basal few not porose. Capsules unknown. — Wet rocks r. Amer. Pacif. distr. Can. Selkirk mts 1885 and 1890: Macoun. (Determined by C. M.)

B. Leaves narrow thickly limbate all around. Peristome very short and brittle soon deciduous or adhering to lid.

4. *S. marginata* Britton.

Leaves narrowly ovate-lanceolate channelled or faintly carinate above, serrate at the obtuse acumen, blackish and nearly appressed when dry; nearly all cells uniform subquadrate exc. the outer rectangular near borders; uppermost cells more opaque. Perichetial leaves similar but longer acuminate. — Rocks above the water-line r. Amer. U. S. Calif.: Marshall A. Howe.

Fam. 24. **Weisiaceæ.**

109. **Barbula** Hedwig.

A. Basal tube of peristome elongate. Pedicel straight.

I. **Syntrichia.** Peristomial legs us. contorted.

1. **Ruraliformes.** Leaves us. lingulate-spathulate, with hairpoint (exc. *B. mutica*); basal cells us. long. Us. dioecious.

2. **Subulatæformes.** Leaves oblong-lanceolate or sublinear lingulate without hairpoint; basal cells long. Monoecious.

3. **Canescentes.** Leaves oval-ovate without hairpoint; basal cells short. Monoecious. Plants small and low.

B. Basal tube of peristome very short or indistinct.

a. Leaves mamillöse. Peristome sometimes not contorted. Pedicel straight or curved.

II. **Timmiella.** Leaves long sublinear, often serrulate above, neither reflexed nor limbate, curled when dry; basal cells rectangular; costa r. excurrent. Capsule cylindric often large.

b. Leaves papillose. Peristome not contorted. Pedicel straight or curved.

III. **Zygotrichia.** Leaves ovate-oblong or ovate-lanceolate reflexed r. with hairpoint; basal cells large rectangular.

1. **Orthopodiæ.** Pedicel straight. Spores about 0,02 m. m. Leaves not limbate.

2. **Camptopodiæ.** Pedicel arcuate when moist. Spores about 0,04 m. m. Leaves broadly yellow-limbate.

c. Leaves papillose or smooth. Peristome us. contorted. Pedicel straight.

aa. Capsule placed on short lateral branches. Leaves broadly limbate below by narrow hyaline cells, serrulate above.

IV. **Pleurochæte.** Leaves not reflexed, curled when dry; costa not excurrent. Peristome much contorted. Dioecious.

bb. Capsule terminal. Leaves gen. entire r. denticulate, us. curled when dry.

V. **Tortella.** Leaves neither reflexed nor limbate, from dilated base gen. longly acuminate, without hairpoint; basal cells

long hyaline ascending higher at margins than the others; costa us. excurrent.

VI. **Tortula**. Leaves sometimes reflexed or limbate, gen. sublingulate or sublinear, sometimes with hairpoint; basal cells not higher ascending at margins.

1. **Cuneifolia**. Leaves smooth not limbate without hairpoint, not or near base slightly reflexed; basal cells long. Stem longish. Spores about 0,015 m. m.

2. **Limbata**. Leaves papillose limbate (by several cell-rows, without hairpoint, not reflexed; basal cells long. Stem very short. Spores about 0,01 m. m.

3. **Muraliformes**. Leaves papillose reflexed to above middle, sometimes limbate by one cell-row, often with hairpoint; basal cells long. Spores about 0,01 m. m. Stem us. short.

4. **Unguiculata**. Leaves papillose not (or only by one cell-row) limbate, without hairpoint, not or only below the middle reflexed; basal cells sometimes short-rectangular. Spores about 0,01 m. m. Stem often long.

VII. **Eu-Barbula**. Leaves not limbate, without hairpoint, gen. from dilated base acuminate, us. reflexed and not large; cells small us. short, the basal not higher ascending. Capsule small us. oblong. Tufts us. dense.

1. **Platyneuron**. Leaves strongly revolute often nearly to costa, entire and us. spirally twisted about stem, small and us. brownish; costa thick. Perichetial leaves sometimes sheathing or subconvolute. Stem low. Dioecious.

2. **Streblotrichum**. Leaves not or not strongly revolute, not sheathing, r. denticulate. Perichetial leaves convolute. Pedicel often yellow.

3. **Leptobarbula**. Upper (also perichetial) leaves sheathing subconvolute not reflexed. Plants small. Dioecious.

4. **Pseudo-Didymodon**. Leaves gen. (not strongly) reflexed, r. denticulate; the perichetial not sheathing. Dioecious.

a. **Acutæformes**. Leaves (at least the perichetial) with long-excurrent costa.

b. **Purpureæformes**. Leaves neither crisped nor curved, small and us. red; costa gen. not excurrent.

c. **Fallaciformes**. Leaves curved us. crisped; costa not excurrent. Annulus of the capsule us. indistinct. Tufts greenish or rufescent.

d. **Vinealiformes**. Leaves curved and crisped; costa some-

times short-excurrent. Annulus revoluble gen. broad. Tufts greenish, rufescent or reddish.

I. *Syntrichia* C. Mueller.

1. *Ruraliformes*.

A. Leaves short not distinctly carinate; lower basal cells uniform hyaline (in *B. laevipila* the outer sometimes narrower and not hyaline); hairpoint often smooth, sometimes (in *B. mutica*) wanting. Peristome contorted, longer than basal tube. Dioecious or (*B. alpina* and sometimes *B. laevipila*) monoecious. Stem not high.

a. Leaves muticous nearly flat, sometimes reflexed near base.

1. *B. mutica* Lindberg. — *Tortula* Lindb.; *Barbula* Kindb.; *B. latifolia* (Bruch) Br. eur.

Leaves subspathulate obtuse. Capsule large; teeth once or twice contorted. Tufts dusky green. Often with propagula (brood-corpuscles). Very r. fruiting. — On base of trees r. on stones. *Eur.* not r. in warmer districts: Germany! Sweden: Lindberg; S. Hardin. *Amer.* r. U. S. Oregon: Roell.

b. Leaves with hyaline us. short and smooth hairpoint, involute (at least when dry) above, flat below.

2 *B. papillosa* Wilson. — *Tortula* Wils.; *Barbula* C. M.

Leaves subspathulate or short-lingulate obtuse. Capsule very small; teeth faintly contorted. Tufts dusky or brownish green. Often with propagula. »Fruiting only in Australia»: Braithwaite. — On trees princ. in warmer distr. *Eur.* less r. Switzerl.; Roell. Norway: E. Nyman. Sweden: Lindberg. France: Husnot. *Amer.* r. »U. S.»: Lesq. et Jam.

c. Leaves us. with hairpoint, not involute, reflexed below.

aa. Peristome not much contorted, much longer than tube.

3. *B. alpina* Br. eur.

Leaves oblong-lingulate sometimes subacute, reflexed below middle: the lower muticous; lower basal cells somewhat small and not much long; costa smooth reddish; hairpoint smooth red or hyaline gen. short. Tufts rusty red below. Monoecious. — Rocks princ. in alps r. *Eur.* Switzerl.! France: Philibert. Austria: Breidler. Sweden: A. Grape.

*** *B. pagorum*** Milde.

»Leaves not reflexed, often with propagula. Capsules unknown. — Stone-walls r. *Eur.* Austria: Milde»: Limpricht.

4. *B. brevipes* Lesquereux. — »*B. alpina*»: cat. Can. m.

Differs from *B. alpina*: Leaves nearly flat at borders, obtuse

often emarginate; hairpoint longer, sometimes denticulate. Peristomial tube longer. Stem and pedicel very much shorter. Dioecious. — *Amer.* r. *Can. Brit. Col.*: Macoun.

5. *B. rotundo-emarginata* C. M. et Kindb. l. c.

Differs from *B. alpina*: Leaves subspathulate shorter and broadly emarginate, more reflexed to above middle; hairpoint hyaline denticulate longer. Capsules unknown. Dioecious. — *Rocks r. Amer. Can. Brit. Col.*: Macoun.

bb. Peristome several times contorted, not much longer than tube.

6. *B. lævipila* Bridel. — *Tortula* Brid.; *Barbula* Br. eur.

Leaves oblong-lingulate us. obtuse, nearly flat or slightly reflexed at base; lower cells sometimes diversiform; costa brown or green not denticulate but sometimes minutely papillose; hairpoint hyaline us. smooth. Capsule long cylindric. Tufts us. olive-green. Sometimes monoecious. — *Trees princ. in warmer distr. Eur.* not r. *France, Switzerl., Italy!* *Sweden*: S. Hardin. *Amer. r. Can.*: Roell.

7. *B. brachyanglia* C. M. et Kindb. l. c.

Differs from the last: Leaves more reflexed; costa red rough; hairpoint pale red at least below, slightly denticulate above. Capsule short suboblong; peristome not seen. Tufts reddish brown. Dioecious. — *Amer. r. Can. Anticosti*: Macoun.

B. Leaves gen. long and distinctly carinate; hairpoint denticulate. Dioecious or (*B. Muellerei*) synoecious.

a. Leaves faintly carinate; basal cells somewhat short and wide nearly uniform, the outer often less pellucid and not much narrower. Synoecious or polygamous.

8. *B. Muellerei* Bruch. — *B. princeps* C. M.

Leaves long sublinear-lingulate obtuse, reflexed to above middle, not or slightly curved when moistened; costa red nearly smooth; hairpoint hyaline. Capsule large; teeth twice contorted. Tufts high, rusty red below. — *On stone r. on trees, r. Eur. France: Philibert. Greece: Heldreich. Italy: Arcangeli. Amer. Pacif. distr. Can.: Macoun. U. S.: com. Cardot.*

b. Leaves distinctly carinate; basal cells long uniform hyaline not porose. Dioecious.

9. *B. norvegica* F. Weber. — *Syntrichia* F. Web. 1804; *Barbula* Lindb.; *B. aciphylla* Br. eur. 1842.

Leaves long sublinear-lingulate more or less acuminate or acute; costa faintly rough; hairpoint red nearly smooth. — *On*

stone in alps. *Eur.* not r. Norway, Switzerl., Spain! Sweden: Lindberg. *Amer.* r. Can.: Macoun.

10. ***B.pseud-acelphylla*** Kindb. in Hedwigia 1896 p. 63.

Leaves long sublinear-lingulate obtuse; costa very rough above; hairpoint red only at base or in upper half. Capsule narrower than in the last; peristome not seen. — Rocks in alp. region r. *Amer.* Brit. Col. and Rocky mts: Macoun. U. S.: Roell.

c. Leave distinctly carinate; basal cells diversiform. Dioecious.

aa. Leaves large long narrow, reflexed nearly all around, us. curved when moistened.

11. ***B.ruralis*** L. — *Bryum* L.; *Barbula* Hedwig.

Leaves broadly limbate below, very papillose, us. obtuse and sublinear-lingulate; outer basal cells (princ. in elder leaves) narrower and porose; costa red very rough above; hairpoint hyaline or only at base red. Peristome red twice contorted; gen. not shorter than tube. Tufts rusty red below. — Stones, sand, trees and roofs. *Eur.* common but in alp. regions r. Sweden, Switzerl.! *Amer.* Can. eastern districts: Macoun.

* ***B.ruraliformis*** Bescherelle.

Leaves gen. ovate-lanceolate acuminate or acute with defluent hairpoint. Tufts brown. — Sandy places r. *Eur.* Sweden! France: Le Jolis. *Amer.* »U. S.: Cardot.

* ***B.alaskana*** Kindb. n. subsp.

Leaves long-attenuate subacute. Peristome faintly twisted shorter than tube. Tufts brown, green above. — *Amer.* r. Can.: J. Macoun. Alaska: J. M. Macoun.

* ***B.rubicundula*** Kindb. n. subsp.

Leaves shorter, all red; the lower with very short red point; costa less rough. Habit of *B. alpina*. — Calcareous rocks r. *Eur.* Sweden in island Oeland!

12. ***B.megalocarpa*** Kindb. bull. Torr. club.

Differs from *B. ruralis*: Leaves us. larger, often short-acuminate acute, less reflexed above; outer basal cells golden yellow and narrower than the inner; hairpoint often red in lower half. Capsule larger; peristome faintly contorted, shorter than tube. — Rocks r. *Amer.* Can. Brit. Col. and Cypress hills: Macoun. U. S.: Roell.

13. ***B.submegalocarpa*** Kindb. in Hedwigia 1896 p. 64.

Differs from *B. ruralis*: Leaves longer narrow and less reflexed above, from broader base attenuate or sublinear; outer basal cells golden yellow not porose; hairpoint often red in

lower half. Peristome faintly contorted, shorter than tube. — Rocks r. *Amer.* Pacif. distr. Can. Brit. Col.: Macoun. U. S.: Roell.

14. *B. læviuscula* Kindb. cat. Canad. musci.

Leaves narrowly limbate below, sublinear-lingulate obtuse, nearly smooth at the borders, not much twisted when dry; the outer marginal cells in 1 or 2 rows hyaline, inner marginal in 2 or 3 rows yellow porose and longer; costa red-brown smooth or indistinctly papillose, more rough near apex; hairpoint gen. wanting, in uppermost leaves denticulate long hyaline or at base red. Capsule narrower than in *B. ruralis*; peristome pale red much contorted and very much longer than tube; pedicel very thin and not long. Tufts high brown. — Rocks r. *Amer.* Can. Rocky mts: Macoun.

bb. Leaves somewhat short and less reflexed, not or scarcely curved when moistened.

15. *B. montana* Esenbeck. — *Syntrichia* Es.; *Barbula* Kindb.; *Syntrichia intermedia* Brid.; *Barbula* Milde.

Leaves sublinear-lingulate broadly limbate below gen. reflexed to above middle; upper cells smaller than in *B. ruralis*; costa brown-red less rough; hairpoint of upper leaves us. very long denticulate or r. short. Peristome us. twice contorted. Tufts olive-green, lower than in *B. ruralis*. — Stones princ. calcareous. *Eur.* not r. Sweden, Switzerl. Engl.: Rogers. Greece: Haussknecht. *Amer.* r. U. S.: Roell.

16. *B. pulvinata* Juratzka. — *B. danica* M. F. Lange; *B. latoexcisa* C. M. et Kindb. l. c.

Leaves somewhat small sublingulate narrowly limbate below by pale green cells, often nearly flat or slightly reflexed; costa nearly smooth us. brown; hairpoint thin faintly rough not long. Capsule somewhat small; teeth once contorted. Tufts brown-green us. not high. — On trees or r. on stones. — *Eur.* not r. Sweden, Norway, Switzerl. *Amer.* r. Can.: Macoun; Roell.

*** *B. papillinervis*** C. M. et Kindb. l. c.

Upper leaves subacute; costa reddish more papillose. Capsule short suboblong. — *Amer.* r. Can.: Macoun; Waghorne.

*** *B. leptotricha*** C. M. et Kindb. l. c.

Leaves with nearly smooth hairpoint. — *Amer.* r. Can.: Macoun.

2. *Subulatæformes*.

A. Leaves us. not reflexed; costa smooth us. excurrent. Peristome shorter than tube.

17. **B. subulata** L. — Bryum L.; Barbula Beauvois.

Leaves suboblong-lingulate or sublanceolate often limbate us. obtusate papillose with yellowish point of costa. Capsule large. Tufts us. green. — On earth. *Eur.* common below alps. Sweden, France, Switzerl. *Amer.* not r. Can.: Macoun.

* **B. angustata** Wilson. — Tortula Wils.; Barbula Schimper.

Leaves oblong-lanceolate acuminate acute; costa long-excurrent. — *Eur.* not common. Sweden, Switzerl. *Amer.* Can.: Macoun.

18. **B. mucronifolia** Schwægrichen. — Tortula Schw.; Barbula Br. eur.

Leaves suboblong obtusate smooth not limbate, smaller than in *B. subulata*, sometimes with reddish point. Differs also in smaller capsule and shorter peristomial tube. — Alp. rocks. *Eur.* not r. Norway, Switzerl. Austria: Venturi. *Amer.* r. Can.: Macoun; Fowler.

B. Leaves reflexed nearly all around; costa papillose gen. percurrent. Peristome longer than tube.

19. **B. inermis** Montagne. — Tortula Mont.; Barbula C. M.

Leaves oblong-lingulate papillose not limbate gen. subobtuse. Tufts brown-green. — Stone in warmer distr. r. *Eur.* Germany: Herpell. France: Husnot. Spain: Dieck, com. Roell. *Amer.* »U. S.»: Lesq. et Jam.

3. Canescentes.

20. **B. canescens** Bruch.

Leaves oval-ovate short-acuminate or subacute papillose not limbate, reflexed nearly all around; costa papillose long-excurrent. Capsule not large; teeth red twice contorted. — Earth on rocks r. *Eur.* in warmer distr. France: Husnot; Le Jolis. Germany: Herpell. Greece: Orphanides.

21. **B. Guepini** Schimper. — Desmatodon Br. eur.

Leaves subovate short-acuminate acute very small slightly reflexed below. Capsule smaller than in the last with larger spores and shorter peristomial tube; teeth half-twisted red or whitish. — Earth r. *Eur.* France: Bescherelle. *Amer.* »U. S.»: Lesq. et Jam.

II. Timmiella Notaris.

A. Leaves with not excurrent costa, often serrulate above.
22. **B. anomala** Br. eur. — Trichostomum Schimp.

Leaves large subacute. Capsule large long oblong-cylindric; teeth red once contorted; annulus narrow; pedicel red. Stem not high, nearly naked below. Tufts dusky or yellowish green. Monoecious or r. synoecious. — On earth and stone-walls r.

Eur. princ. in Mediterr. distr. Switzerl.! Austria: Venturi. Italy: E. Adlerz. Greece: Heldreich. *Amer.* Pacif. distr. Can.: Macoun.

23. **B. lusitanica** Bridel. — *Tortula* Brid.; *Barbula* Kindb.; *Trichostomum Barbula* Schwægrichen.

Leaves large acute or short-acuminate. Capsule as in the last; teeth red not or slightly twisted; annulus none; pedicel red, pale above. Paroecious or monoecious. Resembles the last. — On stones r. *Eur.* princ. in Mediterr. distr. Switzerl.! Portugal: Levier. France: Anthouard.

24. **B. flexisetæ** Bruch. — *Trichostomum* Bruch.; *Barbula* Kindb.; *Trichostomum flexipes* Br. eur.; Husnot m. Gall.

Smaller than the both last. Leaves acute often short-acuminate. Capsule short oblong-cylindric; teeth pale yellow not twisted; annulus broad; pedicel pale above, often deflexed. Tufts low green. Dioecious. — On earth r.: *Eur.* »Portugal and Sardinia»: Schimper. *Amer.* »U. S.»: Lesq. et Jam.

B. Leaves with excurrent costa.

25. **B. vancouveriensis** Brotherus. — *Timmia* Broth.; *Barbula* Kindb.; *Trichostomum* Kindb. cat. Can. m.

Leaves acute longer than in the last, denticulate to below middle. Capsule cylindric; teeth pale not twisted; annulus broad; pedicel yellowish flexuous. Tufts pale green about 3 c. m. high. Dioecious. — Earth r. *Amer.* Can. Vanc. isl.: Macoun; Roell, com. Brotherus.

III. Zygotrichia.

1. Orthopodiæ.

26. **B. latifolia** Hedwig. — *Dicranum* H.; *Barbula* Kindb.; *Tortula* Lindb.; *Desmatodon* Br. eur.

Leaves reflexed nearly all around, short-acuminate or sub-obtuse, sometimes with yellowish point; costa gen. not percurrent. Capsule us. erect suboblong, sometimes broader or narrower; teeth orange-red not or slightly twisted. — Earth in alp. regions. *Eur.* common. Norway, Switzerl.! *Amer.* not r. Alaska: J. M. Macoun. Can.: Macoun; Waghorne.

* **B. brevicaulis** Bridel. — *Desmatodon* Brid.; *Barbula* Kindb.

Capsule slightly inclined; lid often systylic. Stem short. *Eur.* Norway!

* **B. glacialis** Funck. — *Desmatodon* Funck.; *Barbula* Kindb.

Leaves piliferous; costa abbreviate. Stem high. — *Eur.* Norway! France: Husnot. *Amer.* »Greenl.»: Berggren. »Rocky mts.»: Lesq. et Jam.

27. *B. suberceta* Drummond. — *Tortula* Drum.; *Barbula* Kindb.; *Desmatodon obliquus* Br. eur.

Leaves not reflexed in upper third, gen. ovate-oblong acuminate acute; costa long-excurrent. Capsule subcylindric slightly inclined or erect; teeth nearly once or half-twisted pale red. Stem very short. — Rocks in alp. regions r. *Eur.* Norway! *Amer. Can.*: Macoun; Drummond 145.

2. *Camptopodiæ*.

28. *B. Laureri* Schultz. — *Trichostomum* Schz.; *Barbula* Kindb.; *Tortula* Lindb.; *Desmatodon* Br. et Sch.; *Tortula bryoides* Drummond.

Leaves oval-oblong or oblong-lingulate sometimes acute, subpellucid, reflexed all around; costa short-excurrent. Capsule oblong; teeth half-twisted. — Crevices of rocks in alp. regions r. *Eur.* Norway! *Amer. Can.*: Macoun; Drummond 135.

IV. *Pleurochæte* Lindberg.

29. *B. squarrosa* Bridel.

Leaves large ovate-lanceolate long-acuminate nearly subulate, squarrose when moist. Capsule subcylindric; pedicel long. Tufts eradiculose pale green or yellowish. Very r. fruiting. — Calcareous rocks princ. in warmer districts r. *Eur.* Switzerl.! Norway: Ryan. Greece: Heideich. France: Husnot. *Amer.* » U. S. »: Lesq. et Jam.

V. *Tortella* C. Mueller.

A. Leaves rigid very brittle, the lower not crisped. Dioecious r. fruiting.

30. *B. fragilis* Drummond. — *Didymodon* Drum.; *Barbula* Wilson.

Leaves long long-acuminate nearly subulate; costa long-excurrent. Capsule subcylindric somewhat large; teeth red much contorted; pedicel long often very thin. Tufts yellowish green often high. — Wet earth princ. in alps. *Eur.* Sweden, Norway, Switzerl.! *Amer. Can.*: Macoun; Waghorne; Drummond 142.

31. *B. nitida* Lindberg. — *Tortula* Lindb.; *Barbula* Juratzka; *Trichostomum* Schimper.

Leaves sublinear short-acuminate acute shorter than in the last; costa short-excurrent. Capsule oblong-cylindric; teeth yellow rudimentary not twisted. Tufts yellowish or blackish brown below, often not high. — Princ. on calcareous rocks, r. *Eur.* Switzerl.! Engl.: Rogers. Irel.: Holt. Italy: Bottini. Belgium: Gravet. *Amer. Can.*: Macoun.

B. Leaves us. crisped and soft (in *B. tortuosa* sometimes

brittle); costa short-excurrent. Dioecious or (*B. caespitosa*) monoecious.

a. Lower leaves very small, the upper suddenly much larger. Peristome not or slightly twisted. Tufts low yellowish green.

32. *B. flavovirens* Bruch. — *Trichostomum* Bruch; *Barbula* Kindb.; *Tortula* Lindb.

Leaves shorter than in *B. tortuosa*; the upper from broader base sublinear short-acuminate gen. obtuse; costa subpercurrent. Capsule suboblong or subcylindric; teeth dark-red not twisted; pedicel red-yellow. — Calcareous rocks r. *Eur.* princ. in Mediterr. distr. France; Schimper. Italy: Arcangeli; Bottini. Engl.: Holt. *Amer.* »U. S.»: Lesq. et Jam.

* *B. viridiflava* Notaris. — *Trichostomum* Not.; *Barbula* Kindb.

Leaves shorter and not crisped; costa narrower and longer-excurrent. Capsule shorter; teeth orange. — *Eur.* r. Italy: Forsyth, com. Levier.

33. *B. inflexa* Bruch. — *Trichostomum* Bruch; *Barbula* Kindb.; *Tortula* Lindb.

Differs from the last: Upper leaves incurved at apex; costa excurrent to an hyaline point. Capsule suboblong; teeth red slightly twisted; pedicel yellow above. — Calcareous rocks r. *Eur.* Italy: Venturi.

b. Leaves gradually larger upwards. Peristome us. contorted.

34. *B. tortuosa* L. — *Bryum* L.; *Barbula* Weber et Mohr.

Leaves gen. long longly acuminate and nearly subulate, r. shorter and brittle; costa very short-excurrent. Capsule oblong-cylindric or subcylindric; teeth red us. several times contorted; pedicel yellow above. Tufts us. high and yellowish green. — Rocks princ. calcareous. *Eur.* common. Sweden, Norway, Switzerl. *Amer.* not r. Can.: Macoun.

»*Trichostomum Bambergeri* Schimper. — Leaves brittle sublinear or the upper long-acuminate subulate, sometimes broader acuminate with some teeth and large hyaline cells at apex. Capsule oblong-cylindric; teeth red not twisted. Stone-walls r. *Eur.* Austria: Bamberger and Breidler»: Limpricht. — A doubtful species, »*Didymodon mutabilis* var.»: Venturi et Bottini.

35. *B. inclinata* Hedvig fil. — *Tortula* H. fil.; *Barbula* Schwægrichen.

Leaves shorter than in *B. tortuosa*, from broader base sublinear gen. obtusate or sometimes cucullate at apex. Capsule

shorter, suboblong often curved; teeth red less contorted; pedicel yellow above. Tufts dense yellowish green or brown not high. — Calcareous earth. *Eur.* not r. Norway, Switzerl. Greece: Heldreich. France: Boulay.

36. *B. inclinatala* C. M. et Kindb. l. c.

Leaves as in the last but nearly straight when moist and more involute above; the perichetial whitish much broader. Capsule narrow-cylindric not large, nearly straight; teeth much contorted. Tufts loosely cohering about 0,5 c. m. high. — Sandy soil in alps r. *Amer.* Can. Brit. Col.: Macoun.

37. *B. caespitosa* Schwægrichen. — *B. cirrata* Bruch.

Differs from *B. tortuosa*: Monoecious. Leaves shorter, less narrowly or longly acuminate; their hyaline basal part often denticulate above; costa more distinctly excurrent. Capsule smaller; pedicel shorter and thinner, flexuous and yellow, finally reddish. Tufts low often not cohering. — On earth and at base of trees r. *Eur.* France: Spair: Dieck, com. Roell. *Amer.* Can.: Macoun. U. S.: Langlois, com. Cardot.

VI. *Tortula* Bridel, in part.

1. *Cuneifoliae*.

38. *B. cuneifolia* Dickson. — *Bryum* Dicks.; *Barbula* Brid.

Leaves subovate-suboblong or suboval, obtuse or acute and not reflexed: the upper nearly crisped when dry; costa green excurrent to a smooth nearly hyaline often long point. Capsule suboblong; teeth dark purplish scarcely more than once contorted. Tufts green higher than in *B. muralis*. Monoecious. — Rocks in warmer districts r. *Eur.* Engl.: Curnow. France: Husnot. Greece: Heldreich. *Amer.* Can.: Macoun (>*B. Vahlia* cat. Can. m.)

39. *B. subcuneifolia* Kindb. revue bryol. 1896.

Leaves suboval-ovate sometimes acute or apiculate, slightly reflexed below, larger than in the last and not crisped; costa not excurrent finally red-brown. Capsule as in the last; peristomial tube more prominent. Monoecious. — Arctic. Pacific. *distr.* r. *Amer.* Alaska: J. M. Macoun.

40. *B. Garberi* Lesq. et Jam. — *Desmatodon* L. J.; *Barbula* Kindb.

Leaves oblong or lingulate-lanceolate obtuse inflexed above; cells scarcely papillose; costa percurrent. Capsule oblong-oval; teeth partite. Habit of *Trichostomum arenaceum*. Dioecious. — *Amer.* r. U. S.: Lq. et Jam.

2. Limbatæ.

A. Leaves limbaty by yellow narrow-rectangular cells.

41. **B. marginata** Br. eur. — Tortula Spruce.

Leaves suboblong gen. acute; costa somewhat longly excurrent. Peristome once contorted. — Sandstone-walls and roadsides in warmer districts r. *Eur.* France: Philibert; Bouvet. Portugal: Levier. *Amer.* »U. S.»: Lesq. et Jam.

* **B. limbata** Lindberg. — Tortula Lindb.

»Leaves larger, broader limbate. — *Eur.* r. Italy: Rabenhorst; Husnot musc. Gall.

* **B. Egelingi** Schliephacke.

»Leaves smaller, not narrowed at base, broader limbate by larger cells. Capsule smaller. — *Amer.* r. U. S. Tennessee: Egeling; C. M. in Flora 1887.

B. Leaves limbate by subquadrate us. hyaline cells.

42. **B. Solmsii** Schimper.

Leaves oval-oblong gen. obtuse; costa somewhat longly excurrent. Peristome twice contorted. — *Eur.* r. »Portugal: Solms Laubach»; Schimper (Madeira: Fritze, com. Levier.)

43. **B. Porteri** James. — Desmatodon Jam.; Barbula Kindb.

Leaves oblong-lanceolate short-acuminate acute, the lower with yellow marginal cells; costa percurrent. Peristome half-twisted. — Rocks r. *Amer.* Can.: Macoun.

* **B. subcarnifolia** C. M. et Kindb. l. c.

Leaves gen. oblong, less distinctly limbate above; costa sometimes short-excurrent. Peristome faintly twisted. — *Amer.* r. Can. Pelw. island: Macoun.

3. Muraliformes.

A. Leaves somewhat large. Tufts us. loose.

44. **B. muralis** L. — Bryum L.; Barbula Timm.

Leaves sublinear or oblong-lingulate obtuse, reflexed to the hairpoint, often limbate by one cell-row; upper cells opaque; costa us. excurrent. Capsule oblong-cylindric; teeth reddish 2 or 3 times contorted; annulus double. Tufts us. glaucous green and very loose. Us. monoecious. — Stones, stone-walls and roofs. *Eur.* nearly common in lower districts. Sweden, Germany, Switzerl., Italy! *Amer.* r. »U. S.»: Lesq. et Jam.

* **B. æstiva** Schultz.

Leaves long lanceolate-lingulate subacuminate green; costa short-excurrent or subpercurrent. Peristome gen. once contorted. Us. dioecious. — *Eur.* not r. Sweden, Switzerl.!

* **B. ticinensis** Kindb. revue bryol. 1892.

Leaves short oblong-lingulate or subspathulate brown-green; costa short-excurrent. Capsule oblong. Peristome gen. once contorted. — Schistose siliceous rocks. *Eur.* Switzerl. near Luganol

B. Leaves small, less reflexed. Tufts densely cohering.

45. **B. obtusifolia** Schleicher. — *Tortula* Schl.; *Barbula* Schwärgrichen; *Desmatodon* Jur.; *D. flavicans* Br. *eur.*

Leaves short oblong-lingulate obtuse not reflexed in upper third, smaller than in *B. muralis* and not limbate; upper cells opaque; costa percurrent or very slightly excurrent. Capsule suboval or oblong; teeth short brown-red scarcely once contorted; tube sometimes well-distinct; annulus double. Tufts green somewhat dense. *Us.* monoecious. — Rocks in higher alp. region *r.* *Eur.* Switzerl. 1750 metr. a. seal Italy: Philibert (*Asia*, Caucase: Brotherus). *Amer.* Can.: Drummond 115, com. Macoun.

46. **B. Bolanderi** Lesquereux. — *B. carnifolia* C. M. et Kindb. l. c.

Upper leaves lanceolate-lingulate obtuse or subacute, not reflexed in upper third, not limbate; upper cells subpellucid faintly papillose; costa not or slightly excurrent. Capsule suboblong; teeth once contorted; annulus simple persistent. Tufts dirty green. Dioecious. Resembles *B. muralis* **æstiva*. — *Amer.* *r.* Can.: Macoun. *U. S.*: M. A. Howe, com. Cardot.

4. *Unguiculatæ.*

A. Annulus of capsule double. Leaves often limbate by one cell-row. Monoecious.

47. **B. VahlII** Schultz. — *Tortula* Wilson; Braithwaite.

Upper leaves sublinear or oblong-lanceolate obtuse, slightly and partly or not reflexed, subpellucid faintly papillose above; costa long-excurrent. Capsule subcylindric; teeth twice contorted; tube distinct. Tufts yellowish green. Resembles *B. cuneifolia* and *B. muralis*. — Damp clay soil in warmer districts *r.* *Eur.* »Engl.»: Braithwaite. *Amer.* »U. S.»: Lesq. et Jam.

B. Annulus not distinct. Leaves not limbate. Dioecious.
a. Perichetial leaves not sheathing.

48. **B. unguiculata** Hudson. — *Bryum* Huds.; *Barbula* Hedwig.

Leaves obtusate at apex (obtuse or subacute) reflexed below middle, sublinear or subovate-oblong or broadly oblong-lanceolate, suberect when moist; upper cells opaque; the basal narrow-rectangular; costa as. excurrent *r.* percurrent. Perichetial leaves

acute; costa excurrent. Capsule oblong-cylindric; teeth much contorted. Tufts dirty green sometimes high. — Earth and stone. *Eur.* common. Sweden, Italy etc. Greece: Heldreich. *Amer.* not r. *Can.*: Macoun; Waghorne. *U. S.*: Sullivan, com. C. M.

49. B. Cruëgeri Sonder.

Differs from the last: Leaves patent when moist; basal cells short-rectangular; costa very slightly excurrent; only the innermost perichetial leaves acute and very short with not excurrent costa. — On earth r. *Amer.* *U. S.*: Langlois, com. Cardot (Cuba: Wright, herb. Sullivan, com. C. Mueller).

b. Perichetial leaves half-sheathing. All leaves obtuse; costa not excurrent.

50. B. amplexa Lesquereux.

Leaves short suboval or short-lingulate, reflexed near base; basal cells rectangular. Perichetial leaves longer. Capsule sub-cylindric; teeth once contorted. Stems very short not tufted. — *Amer.* r. *U. S.*: Bolander, com. C. Mueller; Howe, com. Cardot. »*Can.*: Drummond»; Macoun.

VII. *Eu-Barbula*.

1. *Platyneuron* Kindb.

A. Leaves us. doubly revolute. Peristome us. contorted.

51. B. Hornschuchii Schultz.

Leaves ovate-lanceolate acuminate acute, revolute to apex and often nearly to the excurrent costa. Perichetial leaves larger, suboblong revolute not sheathing; costa long-excurrent. Capsule oblong-cylindric; teeth much contorted. — On earth r. *Eur.* Belgium: Roemer. France: Brébisson; Berthoumieu. Sweden: J. Persson.

52. B. revoluta Schrader. — *Tortula* Schrad.; *Barbula* Brid.

Leaves ovate-lanceolate acuminate subobtuse, revolute to apex and nearly to costa; prominent lamina very narrow; costa percurrent or slightly excurrent often broader above. Perichetial leaves half-sheathing subconvolute; costa not excurrent. Capsule oblong-oval; teeth nearly twice contorted. Tufts dense. — Princ. on calcareous stonewalls. *Eur.* in lower and warmer districts. France! Italy: E. Adlerz. Germany: Herpell. Spain: Levier.

* **B. obtusula** Lindberg.

Perichetial leaves more open. »Peristome slightly or not twisted»; Lindb. — *Eur.* r. Germany: Goll. »Sweden»: Lindb.

53. **B. platyneura** C. M. et Kindb. l. c.

Differs from *B. revoluta*: Leaves shorter, ovate-oblong acute; costa distinctly excurrent. Capsules unknown. — Rocks r. *Amer. Can. Brit. Col.*: Macoun.

54. **B. revolvens** Schimper. — Desmatodon Husnot m. G.

Leaves oval-oblong obtusate us. obtuse, revolute nearly to apex; prominent lamina somewhat broad; costa scarcely excurrent not broader above. Perichetial leaves sheathing not revolute. Capsule oblong; teeth once contorted. Tufts loose. — Stonewalls r. *Eur. France*: Philibert.

B. Leaves simply not spirally revolute. Peristome half-twisted.

55. **B. atrovirens** Smith. — Grimmia Sm.; Barbula Schimper; Desmatodon nervosus Br. eur.

Leaves oblong-linear or suboval obtusate, revolute nearly to apex; prominent lamina broad; costa broader above us. short-excurrent. Perichetial leaves similar; the innermost one shorter, neither revolute not sheathing. Capsule suboval. Tufts loose. — On stone in warmer distr. r. — *Eur. France*: Le Jolis. *Amer. »U. S.»*: Lesq. et Jam.

56 **B. subtorquescens** C. M. et Kindb. l. c.

Differs from the last: Leaves less opaque and more obtuse not revolute near apex; prominent lamina broader; costa gen. percurrent not broader above. Capsule cylindric. Tufts somewhat higher, very compact. — Rocks r. *Amer. Can. Gaspe coast and Assa*: Macoun.

2. *Streblotrichum* Palisot de Beauvois.

A. Pedicel yellow. Spores small. Dioecious.

a. Peristome much contorted; annulus revoluble. Leaves papillose entire narrow, crisped; basal cells short-rectangular hyaline; costa not excurrent. Tufts us. low.

57. **B. convoluta** Hedwig. — B. Closteri Austin ?

Leaves sublinear or oblong-lanceolate obtusate gen. not reflexed: perichetial nearly nerveless with short point. Capsule oblong; lid shorter. — On earth. *Eur.* common below alp. regions. Sweden, Norway, Switzerl. *Amer. Can.*: Macoun.

* **B. commutata** Juratzka. — Trichostomum undatum Schimper.

Stem higher. Leaves narrow-lanceolate much longer: perichetial broadly acuminate. Capsule larger. — Wet calcareous rocks also in alps r. *Eur. Switzerl.* *Engl.*: Burgess. *Belgium*: Roemer.

58. **B. chrysopoda** C. M. et Kindb. l. c.

Differs from *B. convoluta*: Leaves gen. obtuse; perichetial much broader, truncate or broadly rounded at apex. Capsule shorter than lid. — On earth r. Amer. Pacif. distr. Can. Brit. Col.; Macoun; Vanc. isl.: Macoun; Roell.

59. **B. flavipes** Bryol. eur.

Leaves ovate-lanceolate acuminate acute reflexed nearly all around; perichetial subulate-acuminate. Capsule ovate-oblong; lid much shorter. — Calcareous places in alps r. Eur. Switzerl. Austria: Breidler.

b. Peristome not twisted; annulus revoluble. Leaves mamilllose not crisped; cells gen. subquadrate; lower basal rectangular; costa long-excurrent. Tufts to 2 c. m. high.

60. **B. chloropus** Bridel. — *Ceratodon* Brid.; *Barbula* Kindb.

Lower leaves subovate; the upper ovate-lanceolate attenuate not reflexed. Perichetial leaves convolute with subulate point. Capsule erect suboblong; striate when dry; lid shorter; teeth reddish yellow. Tufts dense. — On earth r. Eur. France: Schimper; Philibert.

B. Pedicel red.

a. Leaves entire reflexed nearly all around. Stem very short.

61. **B. helvetica** Kindb. bull. Soc. botan. ital. 1895.

Leaves smooth ovate-oblong or broadly ovate-lanceolate acuminate acute; cells subquadrate subhyaline; costa percurrent or slightly excurrent. Inner perichetial leaves convolute obtuse or with short obtusate point; costa faint not percurrent. Capsule not seen; pedicel red. Dioecious. — Eur. Switzerl.: L. Mari.

b. Leaves not reflexed. Stem elongate. Dioecious.

62. **B. paludosa** Schleicher. — »*Tortula crocea* Bridel»: Lindb.

Leaves papillose sublinear-lanceolate broadly acuminate acute, denticulate above (at least the perichetial), not or slightly twisted when dry; basal cells long yellowish; costa percurrent or slightly excurrent, in perichetial leaves distinctly excurrent. Capsule oblong striate when dry; lid rostrate; teeth much contorted; annulus none. Stem reddish-tomentose often with propagula. Resembles somewhat *Dichodontium*. — Wet calcareous rocks. Eur. princ. in southern districts. Switzerl. Austria: M. Huss; Venturi. France: Husnot.

63. **B. corsica** Schimper. — *Ceratodon* Sch.; *Barbula* Kindb.

Leaves faintly papillose narrowly ovate-lanceolate gradually subsubulate, entire, crisped when dry; cells subquadrate or

short-rectangular; costa not excurrent. Perichetial leaves convolute with short broad obtuse point; costa not excurrent. Capsule suboblong; lid rostellate; teeth half-twisted with patent points when dry; annulus broad. Tufts dense. Habit of *Ceratodon*. — Sterile siliceous places r. *Eur. Mediterr. distr.* Italy: Arcangeli. France: Goulard.

c. Leaves entire not or indistinctly reflexed. Stem very short.

aa. Leaves papillose. Peristome rudimentary or wanting.
64. **B. bicolor** Br. eur. — *Gymnostomum* Br. eur.; *Barbula* Lindb.

Leaves ovate-lanceolate acuminate acute marked with orange stripes at base; basal cells short-rectangular yellow or brown-yellow; costa percurrent or short-excurrent. Capsule oblong-cylindric plicate when dry; annulus revoluble. Spores large. Tufts dense. Dioecious. — Crevices of calcareous rocks in higher alp. reg. r. *Eur. Switzerl.*: Schimper; Culmann.

bb. Leaves gen. smooth. Peristome much contorted.

65. **B. agraria** Hedwig. — *Bryum* Swartz.

Leaves subovate acute subinvolute, slightly twisted when dry; cells rhombic-quadrate somewhat large; costa subexcurrent. Perichetial leaves broader, short-acuminate or obtusate, not wholly convolute; costa not percurrent. Capsule narrow-cylindric; lid nearly as long; annulus revoluble. Stem nearly indistinct. Monoecious. — Rocks and sand r. *Amer. »U. S.»*; Lesq. et Jam. (Cuba: Wright, herb. Sullivant, com. C. Mueller; St Thomas: Breutel, com. Roell).

66. **B. Raui** Austin.

»Leaves smooth spatulate-ovate acuminate or apiculate; basilar areolation loose; costa subexcurrent. Perichetial leaves convolute often blunt; costa thin. Capsule oblong-cylindric plicate when dry; lid long; annulus narrow. Dioecious. — Rocks r. *Amer. U. S.»*: Lesq. et J.

67. **B. Joorii** C. Mueller in Flora 1875.

»Leaves nearly smooth from oblong half-sheathing base linear-lanceolate obtusate mucronulate, faintly crisped; basal cells short-rectangular hyaline; costa excurrent. Perichetial leaves from oblong sheathing base acuminate not mucronate. Capsule oblong; teeth rufous; calyptra rough. Dioecious. Habit of *B. unguiculata*. Stem very short. — *Amer. r. U. S.»*: C. M.

3. *Leptobarbula* Schimper.

68. **B. tenuis** Hedwig. — *Trichostomum* Hedwig; C. M.; *Barbula* Kindb.; *Didymodon bericus* Notaris.

Upper leaves from sheathing base tapering to a longer and narrow subulate or at apex obtuse entire acumen, crisped; basal cells rectangular; costa nearly filling the acumen but not excurrent. Capsule oval-oblong erect; lid much shorter; teeth half-twisted; pedicel red below, yellow above. Stem short not or loosely tufted. Sterile plants with smaller sublinear or ovate-oblong obtuse leaves. — Calcareous rocks and sandy soil in warmer districts r. *Eur.* Italy: Giordano, com. Bottini. Spain: Hugelmaier, com. C. Mueller. *Amer.* U. S. Massachusetts: Boll, com. C. M. Can. Brit. Col.: Macoun.

69. **B. macrostegia** Sullivant. — *Trichostomum* Sull. icon. muscor. (not mentionned in Lesq. et J. man.); *Barbula* Kindb.

Differs from the last: Leaves abruptly tapering to a somewhat broad but attenuate obtusate acute and near apex denticulate acumen. Capsule cylindric inclined or faintly curved; lid longer; teeth (as in *B. corsica* and *B. sparsidens*) spreading above. — *Amer.* r. »U. S.«: Sullivant.

4. *Pseudo-Didymodon* Kindb.

a. *Acutæformes*.

A. Peristome wanting; annulus revolvable. Leaves faintly papillose, straight when moist.

70. **B. rubiginosa** Mitten.

Leaves ovate-oblong or broadly ovate-lanceolate reflexed below, not appressed; cells short; costa scarcely excurrent. Perichetial leaves from ovate-oblong base tapering to a sublinear by costa not wholly (in lower part) filled point. Capsule suboblong pale brown; pedicel not long. Tufts greenish somewhat dense not high. — *Amer.* r. U. S. Pacif. distr.: Henderson, com. Cardot.

* **B. subciemadophila** C. M. et Kindb. l. c.

Leaves subpellucid above, more spreading when moist; the perichetial with shorter base. Peristomæ and annulus not seen. — *Amer.* r. Can. Brit. Col.: Macoun.

71. **B. melanocarpa** C. M. et Kindb. l. c.

Differs from *B. rubiginosa*: Leaves blackish brown appressed when dry; costa more distinctly excurrent. Capsule dark brown finally blackish; pedicel very long. Tufts loose. Fruiting stem very short. — Rocks r. *Amer.* Can. Brit. Col.: Macoun.

B. Peristome contorted.

a. Leaves smooth straight when moist. Peristome once contorted; annulus us. indistinct.

72. *B. acuta* Bridel. — *Tortula* Brid. 1806; *Barbula* Brid. 1819; *Tortula gracilis* Schleicher 1807; *Barbula* Schwægrichen.

Leaves ovate-oblong entire, reflexed below and strongly recurved near base, patent or twisted when dry; cells short; costa gen. short-excurrent or percurrent. Perichetial leaves suboblong with subulate acumen; costa long-excurrent. Capsule oval-oblong; annulus indistinct. Tufts olivaceous or green. — On earth r. *Eur.* Switzerl. Austria: C. E. Kindberg. France: Berthoumieu. *Amer.* Can.: Mac un.

* ***B. abbreviatifolia*** H. Mueller.

Leaves appressed when dry; costa often longer excurrent. — Wet alp. rocks, sometimes in running water, r. *Eur.* Norway!

73. *B. viridis* Schimper.

Leaves longer than in *B. acuta*, narrowly ovate-lanceolate subulate-acuminate serrulate or denticulate above, reflexed below, crisped; basal cells short-rectangular; costa somewhat long-excurrent. Perichetial leaves as in the last. Capsule cylindric sometimes curved; annulus revoluble. Tufts green. — Rocks in warmer districts r. *Eur.* Switzerl. near Lugano! Belgium: Gravet. (*Asia*, Syria: A. H. Brotherus.)

74. *B. artocarpa* Lesquereux.

Differs from *B. acuta*: Upper leaves ovate-lanceolate subulate; basal cells rectangular; costa more distinctly excurrent. Capsule subcylindric. — On earth in higher alp. regions r. *Amer.* U. S. Oregon mt Hood 3300 metr. a. sea: Roell.

b. Leaves faintly papillose straight when moist. Peristome twice contorted; annulus distinct.

75. *B. lemadophila* Schimper; Braithwaite.

Leaves narrowly ovate-lanceolate reflexed below but not strongly recurved, longer acuminate than in *B. acuta*, appressed when dry; lower basal cells short-rectangular; costa long-excurrent. Tufts olivaceous or dark green. Capsule oval-oblong. Very r. fruiting. — Wet alp. rocks r. *Eur.* France: Thériot, com. Husnot. (*Asia*, Caucase: V. F. Brotherus).

c. Leaves faintly papillose or nearly smooth, curved when moist; lower basal cells pellucid rectangular.

aa. Costa of leaves subpercurrent, in the inner perichetial long-excurrent. Peristome pale contorted.

76. *B. pseudo-rigidula* Kindb. cat. Can. m.

Leaves from short ovate base long-acuminate, reflexed below, twisted when dry; costa brown. Inner perichetial leaves from oblong base narrowly acuminate. Capsule brown subcylindric.

Tufts fuscescent. — Rocks r. *Amer. Can. Brit. Col.*: Macoun
(»*B. rigidula*» Canadian musci n. 412).

77. *B. subgracilis* C. M. et Kindb. l. c.

Leaves ovate-lanceolate reflexed nearly all around, crisped or flexuous when dry; costa reddish. Perichetial leaves faintly crenulate, the outer acuminate, the inner broad obtuse. Capsule red-brown oblong-cylindric. Tufts green or red-brown below. — Rocks r. *Amer. Can. Brit. Col.*: Macoun. U. S. Montana: Roell.

bb. Costa of leaves long-excurrent. Capsules unknown.

78. *B. Waghornei* Kindb. n. sp.

Leaves from short ovate half-sheathing base long-acuminate acute entire, slightly reflexed above base, faintly curled when dry; costa red. Tufts brown-red radiculose. Habit of *Didymodon rubellus*. — *Amer. r. N. Foundl.*: Revd A. C. Waghorne.

b. *Purpureseformes*.

A. Leaves long sublanceolate.

79. *B. purpurea* C. Mueller.

»Upper leaves gradually longer, from oblong base broadly lanceolate subobtuse, revolute to above middle, subtorquate when dry; cells small reddish quadrate; costa purplish thick excurrent. Capsule oval; teeth scarcely contorted; calyptra long. Tufts small purple; stem short naked below. — Rocks r. U. S. Calif.: C. M. in Flora 1875.

80. *B. lateritia* Kindb. n. sp. — *B. brachyphylla* var. *angustifolia* C. M. et Kindb. l. c.

Leaves ovate lanceolate broadly acuminate subobtuse nearly smooth, slightly reflexed or partly flat at borders, crowded, appressed when dry; cells subpellucid subquadrate; costa red thick (princ. above), percurrent. Capsules unknown. Tufts compact brick red 1—2 c. m. high. — Rocks r. *Amer. Can. Brit. Col.*: Macoun.

B. Leaves short gen. ovate.

81. *B. brachyphylla* Sullivant.

»Leaves ovate obtuse recurved all around; costa percurrent. Capsule cylindric; lid long-rostrate; teeth scarcely half-twisted; calyptra short. Tufts dark brown dense high radiculose their whole length. — *Amer. r. U. S.*: Lesq. et Jam.

82. *B. decursivula* Kindb. cat. Can. m.

Leaves recurved nearly all around, faintly papillose, loosely disposed and long-decurrent, subtorquate or loosely appressed when dry; gen. ovate acute; the uppermost of stem and some

branches broadly ovate-lanceolate; cells short small pellucid exc. the elongate alar; costa red not excurrent. Capsules unknown. Tufts 2—3 c. m. high somewhat dense; stem naked below. — Rocks r. *Amer.* Can. Rocky mts: Macoun.

c. Fallaciformes.

A. Peristome very much contorted. Leaves faintly papillose.

83. *B. fallax* Hedwig.

Leaves with ovate base and carinate not much longer acuminate, reflexed at least below middle, us. curled when dry; nearly all basal cells quadrate. Capsule brown oblong-cylindric; annulus not distinct. Tufts us. dense and not low, often rufescent below. — Earth and stone. *Eur.* common. Sweden, Switzerl., Italy! *Amer.* not common. Can.: Macoun.

* *B. brevifolia* Smith. — *Tortula* Sm.; *Barbula* Bridel.

Leaves smaller and shorter, nearly appressed when dry. Capsule smaller; teeth shorter. Tufts us. low and rufescent. — Rocks. *Eur.* not r. Sweden!

84. *B. subfallax* C. Mueller.

Differs from *B. fallax* in its pale green color, basal leaf-cells more distinctly rectangular, capsule short-pedicellate, annulus simple; perichetial leaves longer and larger. — *Amer.* r. U. S.: Lesq. et Jam.

B. Peristome not or faintly contorted. Leaves distinctly papillose.

85. *B. reflexa* Bridel. — *B. recurvifolia* Schimper.

Leaves narrowly ovate-lanceolate gradually subulate-acuminate sharply carinate, falcate when moist. Capsule subcylindric; teeth once contorted. Tufts us. brown and very high. Very r. fruiting. — Calcareous stones. *Eur.* not r. Sweden, Switzerl.! Engl.: West. *Amer.* r. Can.: Macoun; Drummond 139.

86. *B. sparsidens* C. M. et Kindb. l. c.

Leaves small ovate-lanceolate carinate reflexed nearly all around; lower basal cells rectangular hyaline. Capsule small reddish oblong-cylindric; teeth loosely half-twisted with spreading points when dry. Tufts loose 0.5—1 c. m. high, green above, ferruginous below. — On earth r. *Amer.* Can. Brit. Col.: Macoun.

87. *B. semitorta* Sullivant.

Upper leaves linear-lanceolate gradually tapering from near the base, flat at borders, tufted and squarrose; costa thick percurrent. Capsule cylindric-oblong; teeth half-twisted; annu-

lus very narrow not revoluble. Plants short simple loosely caespitose. — *Amer. r. U. S.*: Lesq. et Jam.

88. *B. spadicea* Mitten.

Leaves channelled with short ovate base and longer acumen, reflexed below middle; lowest basal cells short-rectangular. Capsule cylindric; teeth short nearly straight. Tufts brown-green or fuscous not low. — On stone *r. Eur.* Norway, Switzerl. Engl.: Whitehead. Germany: Schliephacke. *Amer. Can.*: Macoun.

* ***B. Zetterstedtii* Schimper.** — *Didymodon* Sch.; *Barbula* Kindb.; *B. vaginata* Lindb.

Leaves larger very acute, the perichetial half-sheathing. Capsules not seen. Resembles *Didymodon rigidulus*. — Rocks *r. Eur.* Sweden!; J. E. Zetterstedt; Lindberg.

d. Vinealiformes.

A. Leaves reflexed all around; cells very pellucid. Plants small.

89. *B. virescens* Lesquereux.

Leaves small broadly ovate-lanceolate nearly smooth; cells gen. short well-distinct, the upper round-oval not confluent. Capsule small cylindric; teeth contorted. Tufts green dense about 1 c. m. high. — Rocks *r. Amer. U. S.* Calif. near Oakland: Bolander, com. C. Mueller.

B. Leaves partly flat at borders. Plants us. high and robust.

a. Upper leaf-cells opaque confluent very papillose.

aa. Leaf-base long ovate-lanceolate; costa not excurrent.

90. *B. cylindrica* Taylor. — *Zygotrichia* Tayl.; *Barbula* Schimp.

Leaves large entire with long narrow acumen, crisped; basal cells short-rectangular. Perichetial leaves gradually acuminate; costa subexcurrent. Capsule reddish cylindric; teeth once contorted. Tufts rusty red us. high. Very *r.* fruiting in Europe. — Rocks and stonewalls. *Eur.* not *r.* in warmer distr. Sweden, Switzerl. Belgium: Gravet. *Amer. Can. Pacif. dist.*: Macoun. *U. S.*: Roell.

91. *B. sinuosa* Wilson. — *Dicranella* Wils.; *Barbula* Braithwaite.

Differs from the last: Leaves lurid green less reflexed with broader base and longer sinuate-denticulate acumen, often brittle; lower basal cells rectangular subhyaline. Capsules unknown. Habit of *Didymodon tenuirostris*. — Rocks *r. Eur.* Austria: Venturi. Engl.: Boswell. France: Berthoumieu. Belgium: Gravet. *Amer. U. S. Wash.*: Roell.

92. *B. elata* Durieu et Montagne.

Leaves entire nearly gradually subulate not large, faintly crisped; basal cells pellucid gen. rectangular. Perichetial leaves with narrower often sublinear channelled acumen; costa sub-excurrent or in the shorter uppermost leaves wanting. Capsule reddish subcylindric; teeth contorted. Tufts brown-green often high. — *Amer. r. Pacif. distr. U. S.*: Roell; Henderson, com. Cardot.

bb. Leaf-base subovate or ovate-oblong; costa often excurrent.

93. *B. vinealis* Bridel.

Leaves with oblong base and not longer in upper part subulate-filiform acumen, reflexed below middle, nearly straight when moist; inner basal cells short-rectangular; costa nearly filling the upper part of acumen, in the more abruptly attenuate perichetial longer excurrent. Capsule short oblong-cylindric; teeth short pale once contorted. Tufts lower than in *B. cylindrica*, us. brown or brown-red. Not r. fruiting. — Rocks and stone walls. *Eur.* not r. in warmer distr. Switzerland France: Husnot m. Gall. Italy: Venturi; Roell. *Amer. r. Can.*: Macoun.

94. *B. flexifolia* Hampe.

Differs from *B. vinealis* in leaves crisped when dry, falcate when moistened, borders revolute; capsule narrower subcylindric dark red or brown; teeth much twisted reddish then whitish or variable in color. — On the ground r. *Amer. U. S. Calif.*; Lesq. et Jam.

95. *B. circinnatula* C. M. et Kindb. l. c.

Leaves from ovate or ovate-oblong base somewhat abruptly narrowed to the subulate much longer acumen, reflexed below, curved when moist, circinnate when dry; basal cells gen. short dusky; costa well-distinct but not excurrent also in the nearly similar perichetial leaves. Capsule subcylindric; teeth pale much contorted; annulus simple by one row of large cells. Tufts greenish somewhat high, or red-brown below. — Wet earth and rocks r. *Amer. Can. Pacif. distr.*: Macoun.

96. *B. subcylindrica* Brotherus.

Leaves from subovate base abruptly narrowed to the longer and subobtuse acumen, falcate when moist; lower basal cells rectangular hyaline. Tufts dark brown. Capsules unknown. Otherwise as the last. — *Amer. r. U. S. Pacif. distr.*: Roell, com. Brotherus.

97. **B. horridifolia** C. M. et Kindb. l. c.

Differs from the both last and *B. vinealis* in leaves faintly papillose loosely disposed long-decurrent. Leaves from ovate base narrowed to a longer and long-subulate acumen, falcate when moist, crisped or spreading when dry; basal cells pellucid short-rectangular, the inner larger; costa broader below vanishing in apex, not excurrent. Capsule cylindric; teeth reddish scarcely more than once contorted with long in dry state spreading points. Tufts somewhat high, brown or rusty red below, greenish at tops. — Damp rocks r. *Amer. Can. Pacif. distr.: Macoun.*

98. **B. tortellifolia** C. M. et Kindb. l. c.

Differs from the last: Leaves broader, less distinctly decurrent; the costal larger and crowded with short-excurrent costa. Perichetial leaves suddenly tapering to a long narrow acumen; costa slightly excurrent. Peristome whitish. Tufts often higher sometimes quite red. — Wet rocks. *Amer. Pacif. distr. princ. near sea. Can. less r.: Macoun.*

b. Leaves also the uppermost nearly smooth; upper cells pellucid well-distinct.

99. **B. robustifolia** C. M. et Kindb. l. c.

Leaves shorter and more crowded than in the last, from ovate base narrowed to the subulate acumen, reflexed nearly to middle at one side, falcate or crisped; basal cells subquadrate hyaline; costa equally broad and distinct to apex, not excurrent. Capsules unknown. Tufts dark brown or olive-green. — Rocks r. *Amer. Pacif. distr. Can.: Macoun. U. S.: Roell.*

110. **Ceratodon** Bridel.

A. Leaves carinate. Outer perigonal leaves long-acuminate acute.

1. **C. purpureus** L. — Mnium L.; *Ceratodon* Brid.

Leaves reflexed nearly all around, entire or slightly denticulate near apex, gen. not decurrent, us. broadly ovate-lanceolate attenuate not subulate at apex; cells small us. chlorophyllose; costa us. percurrent. Inner perichetial leaves (1 or 2) obtusate or short-acuminate. Capsule sometimes strumose us. curved when dry; teeth with numerous articulations, often marginate; lid elongate-conic; pedicel red. Outer perigonal leaves with scarcely excurrent costa. Tufts us. not tomentose. Dioecious. — Gravelly soil. *Eur. common. Sweden etc. Amer. Can.: Macoun.*

* **C. brevifolius** Milde. — *C. dimorphus* Philibert.

Leaves ovate-oblong; costa often long-excurrent. — *R. Eur.* Switzerl.: Philibert. *Amer.* U. S. Oregon: Lyall, com. Macoun.

* **C. xanthopus** Sullivant.

Leaves long-subulate; costa gen. excurrent. Perichetial leaves 2 or 3 more distinct. Pedicel yellow. — *Amer. r. Can. Brit. Col.:* Dawson, com. Macoun.

* **C. arcticus** Kindb. n. subsp.

Leaves small subdecurrent, not much patent when moist; cells hyaline not chlorophyllose, larger than in the common *C. purpureus*. Tufts compact tomentose. Capsules unknown. — Arctic distr. *r. Eur.* Spetsbergen near Kobbefay: Berggren 1868.

2. C. conicus Hampe. — *Trichostomum* Hampe; *Ceratodon* Lindb.; *C. minor* Austin.

Differs from *C. purpureus*: Leaves shorter; costa not *r.* excurrent. Capsule straight; teeth immarginate with few articulations. — Earth and walls *r. Eur.* Switzerl.; Mari. *Amer. Can. Brit. Col.:* Macoun.

3. C. Columbiæ Kindb. revue bryol. 1896.

Leaves narrowly ovate-lanceolate subulate-acuminate, reflexed below the somewhat long serrulate acumen; costa gen. excurrent. Inner perichetial leaves (2 or 1) with somewhat long linear or lingulate acumen. Capsule curved when dry; teeth with numerous articulations, broadly margined; lid short-conic obtuse or subconvex; pedicel red. Outer perigonal leaves with long-excurrent costa. Monoecious. — *Amer. r. Pacif. distr. Can. Brit. Col.:* Macoun.

B. Leaves concave, princ. those of the long shoots. Perigonal leaves obtuse, the outer not long-acuminate.

4. C. heterophyllus Kindb. in Ottawa Nat. vol. V.

Leaves of the short stem very few, narrowly ovate-lanceolate subobtusely entire reflexed; costa percurrent. Shoot-leaves small oval obtuse not distinctly reflexed; costa scarcely percurrent. Capsule short not curved; teeth with few articulations; lid short-conic; pedicel pale red or yellowish, finally red or blackish. Dioecious. — Arctic distr. *r. Amer.* Alaska: J. M. Macoun.

111. **Geheebia** Schimper.

1. G. gigantea Funck. — *Barbula* Funck; *Geheebia* Boulay.

Leaves papillose entire carinate, reflexed below, gradually acuminate or subovate-lanceolate with acute or subulate apex, subfalcate when moist, spreading or faintly crisped when dry; lower cells sinuous, upper subquadrate; costa subpercurrent.

Tufts blackish or brown when dry, 6—20 c. m. high. Resembling *Barbula reflexa* but more robust. — Rocks in alp. region r. *Eur.* Switzerl.! France: Husnot. Germany: Holler. Austria: Berggren.

112. **Aloina** (C. M. as subg.) Kindb. in Skandinav. Naturforskaremötets handl. 1880.

A. Leaves close when dry, not patent when moist. Us. synoecious.

1.A.brevirostris Hooker et Greville. — *Tortula* H. et G.; *Aloina* Kindb. l. c. and Laubm. Schw. u. Norw.

Leaves ovate-oval very broad, cucullate above; costa not excurrent. Capsule us. cylindric with much shorter lid, r. subovoid with nearly half as long lid; teeth us. once contorted; calyptra reaching below lid; annulus broad partly revoluble. — Walls princ. in limestone districts. *Eur.* Sweden: Hartman. Norway: E. Nyman. *Amer.* Greenl.: Berggren. Can.: Macoun.

B. Leaves incurved when dry, patent when moist. Dioecious.

a. Peristome twice contorted; annulus broad revoluble. Calyptra reaching to the half of capsule.

2.A.stellata Schreber. — *Bryum* Schreber 1771; *Aloina* Kindb. Laubm. S. u. N.; *Barbula rigida* Hedwig 1787.

Leaves suboblong or narrower us. cucullate sometimes hair-pointed; costa us. not excurrent. Capsule suboblong; lid much shorter; pedicel red-brown. — Walls and clay banks. *Eur.* Norway, Switzerl.! Austria: Venturi. Greece: Orphanides. *Amer.* Can.: Macoun.

3.A.macrorhyncha Kindb. — *Barbula* (*Aloina*) cat. Can. m.

Leaves round-ovate cucullate; costa not excurrent. Capsule oblong-ovoid; lid more than $\frac{2}{3}$ its length; pedicel pale red or yellowish. — On earth r. *Amer.* Can.: Macoun.

b. Peristome once contorted; annulus narrow us. persistent. Calyptra short. Capsule subcylindric.

4.A.ambigua Br. eur. — *Barbula* Br. eur.; *Aloina* Limpricht; *A. ericæfolia* Kindb. Laubm. S. u. N.; *Tortula* Lindb.

Leaves lanceolate-linear us. hamate-incurved at apex, sometimes subacute; costa not excurrent. Capsule erect at least twice longer than lid; pedicel yellowish above and reddish below, finally red-brown; calyptra not reaching below lid. — Walls. *Eur.* Norway! France: Husnot. Greece: Orphanides. Roemer. *Amer.* Can.: Macoun.

5. **A.aloides** Koch. — *Trichostomum* Koch; *Aloina* Kindb. l. c.; *Tortula* Notaris; *Barbula* Bruch.

Leaves shorter and narrower than in the last, incurved or cucullate, gen. acute with prominent subexcurrent costa. Capsule often inclined us. much longer than lid; pedicel reddish; calyptra not much prolonged below lid. — Clay banks. *Eur.* France: Husnot. Germany: Roemer. Italy: Arcangeli. Greece: Orphanides.

113. **Crossidium** Juratzka.

A. Leaves blunt. Dioecious.

1. **C.chloronotos** (Bridel in part) Bruch. — *Barbula* (Brid.) Bruch; *Crossidium* Limpricht.

Leaves oblong-lingulate, appressed when dry; hairpoint shorter nearly smooth; upper leaf-cells greenish. Capsule narrow-oblong at least twice longer than the rostrate lid; teeth twice contorted; tube long. Tufts dense. — Calcareous rocks and soil r. *Eur.* Mediterr. distr. France: Schimper; Venturi; Philibert.

2. **C.Heinrici** Rau. — *Barbula* Rau; *Crossidium* Kindb.

»Differs from the last: Leaves few small more arrounded at apex; some cells decolorate; hairpoint denticulate. Capsules unknown. — *Amer.* r. U. S. Kansas: Rau: C. M. in *Flora* 1886.

3. **C.Manniae** C. Mueller. — *Barbula* (*Argyrobarbula*) C. M.; *Crossidium* Kindb.

»Leaves few small without hairpoint; lamellæ few. Capsule small; peristomial tube short. — *Amer.* r. U. S.: C. M. in *Flora* 1887.

B. Leaves narrowed above to the subacute apex. Monoecious.

4. **C.squamigerum** Viviani. — *Barbula* Viv.; *Crossidium* Jur.; *Tortula membranifolia* Hooker; *Barbula* Schultz.

Leaves subovate; hairpoint us. as long and denticulate; upper leaf-cells hyaline. Capsule oblong, subcylindric or suboval, finally blackish, longer than the rostrate lid; teeth twice contorted; tube long. Tufts dense. — Calcareous stones in warmer distr. r. *Eur.* France: Le Jolis; Bouvet. *Amer.* »U. S.: Lesq. et Jam.

5. **C.griseum** Juratzka.

Differs from the last: Capsule finally brown; teeth shortish not or faintly twisted nearly without basal tube. Leaves with nearly smooth often longer hairpoint; those of shoots more obtuse. — *Eur.* r. Italy: Roell; Bottini.

114. **Pterygoneuron** Juratzka.

A. Capsule immersed; calyptra mitriform. Leaves with long rough hairpoint.

1. **P. subsessile** Bridel. — *Gymnostomum* Brid.; *Pterygoneuron* Jur.; *Pharomitrium* Schimper.

Leaves suboval or obovate subacute not reflexed, papillose at back. Capsule oval-globose; pedicel shorter; lid rostrate; peristome none. Stem 2—5 m. m. high. — Sand and clay r. *Eur.* Austria: Berggren. Germany: Schultze. *Amer.* Can.: Macoun.

B. Pedicel exserted; calyptra cucullate. Leaves with smooth point.

2. **P. cavifolium** Ehrhart. — *Pottia* Ehrh.; *Pterygoneuron* Jur.

Differs also from the last in leaves smooth at back. — Clay soil, often on walls. *Eur.* not uncommon. Sweden! France: Husnot. *Amer.* Can.: Macoun; Drummond.

3. **P. lamellatum** Lindberg. — *Tortula* Lindb.; *Pterygoneuron* Jur.; *Barbula cavifolia* Schimper.

Differs from the last: Leaves papillose at back, faintly reflexed below; costa shorter excurrent. Capsule oblong-cylindric; peristome slightly twisted, loosed with difficulty; basal membrane clathrate. Stem somewhat higher. — Wet clay soil r. *Eur.* France: Becherelle. Austria: Berggren.

115. **Didymodon** Hedwig, in part.

A. Leaves gen. entire; cells small at least the upper, r. (in *Stegonia*) large.

a. Leaves not reflexed, often involute. Peristome not twisted.

I. **Stegonia.** Leaves close also when moist, smooth entire very broad concave or involute; cells large. Perichetial leaves not sheathing. Stem short. Monoecious. Spores large.

II. **Trichostomum.** Leaves not imbricate when moist, us. crisped when dry, papillose us. narrow. Spores small.

1. **Pusilli.** Peristome slightly twisted. Plants small; stem very short. Monoecious.

2. **Crispuliformes.** Peristome not twisted. Dioecious. Plants larger.

b. Leaves not involute gen. reflexed.

aa. Leaves half-sheathing, sometimes dentate above.

III. **Erythrophyllum.** Leaves reflexed papillose us. pointed by a long pellucid apical cell; basal cells long, hyaline or finally reddish. Perichetial leaves sheathing. Peristome pale straight. Tufts us. rusty red. Us. synoecious.

bb. Leaves entire not sheathing. Tufts dense.

IV. **Desmatodon**. Leaves short broad gen. reflexed, crisped; basal cells long somewhat large and hyaline; costa often long-excurrent. Peristome straight. Habit of *Barbula* (*Zygotrichia*). Often monoecious.

V. **Eu-Didymodon**. Leaves reflexed us. short, r. twisted when dry; cells small gen. short, the inner basal us. rectangular yellowish; costa gen. not or slightly excurrent. Peristome sometimes twisted. Habit of *Barbula* (*Eu-Barbula*). Dioecious often sterile.

B. Leaves gen. denticulate, not imbricate, sometimes with propagula; cells somewhat large; costa not or shortly excurrent. Peristome r. present. Us. dioecious.

VI. **Leptodontium**. Leaves dentate or denticulate, often not reflexed, gen. broad and obtusate, often crisped when dry; basal cells at least the lowest rectangular hyaline.

VII. **Hydrogonium**. Differs from subg. *Leptodontium* in entire leaves.

I. *Stegonia* Venturi revue bryol.

1. **D. latifolius** Schwægrichen. — *Weisia* Schw.; *Didymodon* Kindb.; *Pottia* C. M.

Leaves orbicular or subcochleariform gen. obtuse, sometimes apiculate or with long hairpoint; upper cells subrhombic, the lower hyaline longer; costa abbreviate or percurrent. Capsule suboval or subcylindric; teeth pale red. Spores 0,03--0,04 m. m. Tufts low green somewhat silver-like. — Earth on alp. rocks. *Eur.* less r. Norway, Switzerl. Austria: Breidler. *Amer.* r. Can.: Macoun; Drummond 70.

II. *Trichostomum* Hedwig, in part.

1. Pusilli.

2. **D. triumphans** Notaris. — *Trichostomum* Not.; *Didymodon* Kindb.

Leaves lanceolate-linear acute or obtuse; costa short-excurrent. Perichetial leaves sheathing. Capsule oval; pedicel pale yellow or at base reddish. — Earth and walls r. *Eur.* princ. in Mediterr. distr. France: Philibert.

* **D. monspeliensis** Schimper. — *Trichostomum* Sch.; *Didymodon* Kindb.

Leaves concave, the perichetial with percurrent costa. Annulus simple. — *Eur.* r. »France»: Schimper.

* **D. philiberti** Schimper. — *Trichostomum* Sch.; *Didymodon* Kindb.

Perichetial leaves with excurrent costa. Annulus simple. --
Eur. r. France: Philibert; Goulard.

* **D. pallidisetus** H. Mueller. — *Trichostomum* H. M.; *Didymodon* Kindb.

Leaves plane below, the perichetial with percurrent costa. Capsule finally striate; annulus simple; pedicel wholly pale yellow. — *Eur. r.* Germany: Geheeb.

2. *Crispuliformes*.

A. Leaves carinate from dilated undulate base gradually subulate. Habit of *Barbula* (Tortella). R. fruiting.

3. **D. cylindricus** Bruch. — *Weisia* Bruch; *Didymodon* Br. eur.

Leaves long narrow acute or subobtuse, sometimes sparingly denticulate near apex; basal cells hyaline; costa not excurrent. Capsule cylindric. Tufts dark green. — Siliceous rocks. *Eur.* not common. Switzerl.! Sweden: Lindberg. *Amer. Can.*: Macoun.

4. **D. hibernicus** Mitten. — *Tortula* Mitt.; *Didymodon* Kindb.

Differs from the last: Leaves entire acute more dilated at base; basal cells abruptly passing to the rounded green ones. Stem often very long. — Wet rocks r. *Eur.* Ireland: Stewart and Holt.

B. Leaves not carinate, sublinear or with sublinear or subulate acumen, entire.

a. Leaves channelled or involute; basal cells us. yellowish, upper very small opaque papillose.

5. **D. brachydontius** Bruch. — *Trichostomum* Bruch; *Didymodon* Wilson; *Trichostomum mutabile* Notaris.

Leaves sublinear or narrowly ovate-lanceolate gen. acute, sometimes ovate-oblong short-acuminate, not channelled near apex; basal cells brownish or yellowish; costa excurrent. Capsule oval-oblong or subcylindric; teeth smooth us. short irregular; pedicel yellow. Tufts loose 1—2 c. m. high or lower. — Calcareous rocks. — *Eur.* Switzerl.! Sweden: Zetterstedt; P. Larsson. Belgium: Roemer. France: Philibert; Brébisson.

6. **D. lutescens** Lindberg. — *Mollia* Lindb.; *Didymodon* Kindb.

Differs from the last: Leaves smooth pellucid longer-apiculate; upper cells better defined. Tufts yellowish green. Capsules unknown. — Fissures of limestone rocks r. — *Eur.* Irel.: Lindb.; Braithwaite.

7. **D. crispulus** Bruch. — *Trichostomum* Br.; *Didymodon* Wilson.

Leaves from subovate base sublinear or r. suboblong, short-attenuate often subobtuse, distinctly channelled or involute;

basal cells yellowish or subhyaline; costa often excurrent to a curved point. Capsule oval-oblong; teeth papillose often deeply cleft; pedicel red. Tufts dense very low or 2—6 c. m. high. — Calcareous stones. *Eur.* Sweden, Switzerland. Spain: Levier. France: Roux; Berthoumieu. *Amer. r.* »U. S.«: Lesq. et Jam. 8. **D. viridulus** Bruch. — *Trichostomum* Br.; *Didymodon* Kindb.

Differs from the last: Leaves longer, linear-lanceolate, gradually long-acuminate subulate. Capsule smaller. Stem low. — *Eur. r.* Sweden! Switzerland: Culmann, eom. Husnot.

9. **D. brevifolius** Sendtner. — *Trichostomum* Sendt.; C. M. syn.; *Didymodon* Kindb.; *Mollia* Braithwaite.

Leaves short from broader base nearly gradually attenuate obtuse; basal cells yellowish pellucid; costa sometimes excurrent. Capsule minute round-oval; lid as long; teeth papillose; pedicel reddish below, yellow above. Tufts dense 0,5—1,5 c. m. high. Habit of *D. crispulus*. — Limestone rocks r. *Eur.* »Engl.«: Braithwaite. »Bosnia: Sendtner«: C. M.

b. Leaves concave not involute, somewhat broad and sub-oblong-linear; basal cells hyaline.

10. **D. littoralis** Mitten. — *Trichostomum* Mitt.; *Didymodon* Kindb.

Leaves obtuse; costa smooth yellowish short-excurrent. Capsule oblong; teeth deeply cleft. Tufts green 1—4 c. m. high. — Rocks near Atlantic sea r. *Eur.* Engl.: Curnow. France: Le Jolis. Norway: Hagen.

11. **D. trachyneuron** Kindb. n. sp.

Leaves short-attenuate subacute brittle; costa pale, papillose at back, sometimes excurrent. Tufts low green. Capsules unknown. — Rocks r. *Amer.* Can. near Quebec: Macoun.

III. *Erythrophyllum* Lindberg.

A. Leaves nearly smooth and faintly reflexed, not twisted when dry. Tufts loose eradiculose. Capsules unknown.

12. **D. oenodes** C. M. et Kindb. — *D. oeneus* C. M. et Kindb. cat. Canad. m. (not *D. æneus* Schimper).

Leaves vinous-red ovate-oblong or narrowed from subovate base, acute entire not apiculate, loosely appressed when dry; costa nearly smooth at back. — Rocks r. *Amer.* Can. Brit. Col.: Macoun.

B. Leaves distinctly papillose and reflexed, crisped. Tufts dense.

a. Leaves from broad-ovate base long-subulate; costa sometimes excurrent. Plants robust,

13. *D. ruber* Juratzka.

Leaves long acute or subobtuse at apex, often denticulate near it. Inner perichetial leaves subfiliform-subulate smooth and not recurved; costa filling nearly the whole upper part of acumen. Capsule straight; cells of the rostellate lid in straight rows. Tufts reddish. Dioecious, very r. fruiting. — Alp. rocks r. *Eur.* Austria: Breidler. *Switzerl.* fruiting: Philibert.

b. Leaves short-acuminate or obtuse obliquely apiculate; costa not excurrent. Plants not robust.

14. *D. rubellus* Hoffmann. — *Bryum Hoffm.*; *Didymodon Br.* et Sch.

Leaves from short ovate base sublinear-cultriform, at apex us. obtusate and entire or with few teeth. Perichetial leaves nearly as long and similar. Capsule straight or indistinctly curved; cells of lid as in the last. Us. synoecious. — Stone and earth. *Eur.* common. Sweden etc. *Amer.* not r. *Can.*: Macoun; Waghorne.

15. *D. alpinus* Venturi. — *D. rubellus* var. *dentatus* Schimper.

Leaves as in the last but more distinctly acuminate acute often dentate near apex. Perichetial leaves subsubulate narrower. Capsule narrower; lid with obliquely seriate cells. Dioecious. — Rocks in alp. regions r. *Eur.* Norway, *Switzerl.* *Amer.* »Greenl.«: Lange.

16. *D. canadensis* Kindb. cat. can. m.

Differs from *D. rubellus*: Capsule narrower. Perichetial leaves short acuminate smooth not reflexed. Dioecious. — Rocks r. *Amer.* *Can.*: Macoun; Waghorne.

17. *D. subruber* Kindb. revue bryol. 1896.

Leaves as in *D. rubellus* but often dentate. Perichetial leaves long-subulate not recurved. Capsule curved; lid rostrate. Dioecious. — Rocks r. *Amer.* *Can.* *Brit. Col.*: Macoun.

18. *D. Baden-Powellii* Kindb. in *Ottawa Natur.* vol. V.

Leaves as in *D. rubellus* but smaller shorter often denticulate, less twisted when dry. Perichetial leaves as in *D. canadensis*. Capsule curved; lid short blunt very thick. Tufts very compact, pale brown below. Dioecious. — Arctic distr. r. *Amer.* *Alaska*: J. M. Macoun.

19. *D. Debatii* Husnot revue bryol. 1895.

Differs from other species of this section in leaves densely serrulate above basal part. Leaves from narrowly oblong base gradually tapering to a scarcely longer acumen, not or slightly crisped when dry. Stem about 5 c. m. long. Capsules un-

known. -- Stony places r. *Eur. r.* »France, 2000 metr. a. s.»;
Husnot l. c.

IV. *Desmatodon* (Bridel) Schimper, in part.

A. Leaves with not excurrent costa, papillose.

20. *D. arenaceus* Sullivant et Lesquereux. — *Desmatodon* S. L.;
Sulliv. icon. m.; *Didymodon* Kindb.

Leaves suboblong or oblong-lanceolate gen. obtuse, reflexed
nearly all around. Capsule long cylindric; teeth short whitish
cleft to middle; lid short thick. Stem 1–2 c. m. high. Mono-
ecious or pseudo-monoecious. — Sandstone rocks r. *Amer.*
U. S.: Sullivant, com. C. Mueller; Demetrio, com. Cardot. *Eur.*
»Norway»: Hagen.

B. Leaves with long-excurrent costa.

22. *D. plinthobius* Sullivant et Lesquereux. — *Desmatodon* S. L.;
Didymodon Kindb.

Differs otherwise from the last: Lid of capsule narrower
somewhat longer. Dioecious. — Limestone rocks r. *Amer.*
U. S.: Ravenel, com. C. Mueller; Langlois, com. Cardot.

22. *D. neomexicanus* Sull. et Lesq. — *Desmatodon* S. L.; *Didy-*
modon Kindb.

»Differs from the last in nearly entire peristomial teeth.
Monoecious. — *Amer. r.* U. S. Texas: Wright»: Lesq. et Jam.

23 *D. systylius* Schimper. — *Desmatodon* Sch.; *Didymodon*
Kindb.

Leaves oblong-lingulate acute gen. short-acuminate, subpellu-
cid and nearly smooth, flat or near base indistinctly reflexed.
Capsule cylindric; teeth irregularly cleft yellowish or reddish;
lid systylic; pedicel yellow or finally pale red. — Rocks r.
Eur. in higher alp. region. *Eur.* Norway. *Amer.* N. Foundl.:
Waghorne (»*D. systylioides*» Ren. et Card.). Can. Manitoba:
Macoun.

V. *Eu-Didymodon*.

A. Leaves broadly acuminate or obtuse. Tufts not high.

a. Leaves papillose; costa not excurrent. Peristome well-
evolute.

24. *D. topiaceus* Bridel. — *Trichostomum* Brid.; *Didymodon*
Juratzka; *D. Hendersoni* Ren. et Card.; *Barbula brevifolia* Lindb.

Leaves ovate-oblong or ovate, obtuse or acute us. concave
with thick borders, more or less crisped. Capsule ovate-oblong
or subcylindric; pedicel red. Tufts olivaceous reddish-brown
below us. very compact r. loose. — Rocks princ. calcareous
and stonewalls. *Eur.* princ. in warmer districts, not r.

Switzerl., Norway! France: Le Jolis. *Amer.* Can.: Macoun. U. S.: Henderson, com. Cardot.

b. Leaves smooth. Peristome often rudimentary.

25. *D. luridus* Hornschuch. — *Trichostomum* Spruce.

Leaves ovate oblong or broadly ovate-lanceolate acute, nearly appressed when dry; cells short; costa percurrent. Capsule oval-oblong or subcylindric; pedicel red. Tufts finally lurid-brown.

— Rocks and stonewalls. *Eur.* not r. in warmer distr. Switzerl.! Engl.: Holt. France: Husnot. Germany: Herpell. *Amer.* r. Can.: Macoun. U. S.: Mrs L. C. Feeley.

26. *D. Lamyi* Schimper; Husnot.

Differs from the last: Leaves slightly crisped; basal cells long hyaline; costa slightly excurrent. Pedicel yellow above. Tufts dark green. — Rocks r. *Eur.* France: Lamy, com. Husnot.

27. *D. cordatus* Juratzka. — *Trichostomum* Milde.

Leaves broader than in *D. luridus*, subcordate at base, curved when dry, often short subovate; costa percurrent or slightly excurrent. Tufts green often with propagula. Capsules unknown. — Schistose and calcareous rocks r. *Eur.* Switzerl.! Italy: E. Adlerz. Germany: Herpell.

B. Leaves narrowly acuminate.

a. Leaves gen. papillose, faintly twisted when dry. Tufts us. low and fuscous.

28. *D. rigidulus* Hedwig. — *Barbula* Mitten.

Leaves from long ovate-lanceolate base tapering to the narrow nearly as long acumen, with thick reflexed borders, nearly straight when moist; the upper part of acumen nearly filled by costa; lower basal cells often long. Capsule oval-oblong or cylindric; teeth not contorted but us. faintly twisted; pedicel red. — Rocks and stonewalls. *Eur.* not r. Sweden, Norway, Switzerl.! Scotl.: Fergusson. *Amer.* r. Can.: Macoun. U. S.: Roell.

29. *D. validus* Limpricht.

Leaves smooth from ovate-oblong base tapering to a not long acumen, gen. with thick reflexed borders, nearly straight when moist; cells gen. short; costa thick often long-excurrent. Capsules unknown. Tufts brown loosely cohering, about 1 c. m. high (½ c. m. or more: Limpricht). — Calcareous alp. rocks r. *Eur.* Austria: Gander.

30. *D. Dieckii* Broth. — *Barbula* Broth.; *Didymodon* Kindb.

Leaves from broad ovate-oblong base abruptly narrowed to the subulate not longer acumen, flat above, not or slightly

reflexed below, straight when moist; nearly all cells quadrate; costa short-excurrent or percurrent. Capsules unknown. Habit of the last. — *Amer. r. U. S.*: Roell, com. Brotherus.

b. Leaves mamilllose nearly appressed when dry. Tufts us. red-brown, often high and very large.

31. *D. rufus* Lorentz. — *Barbula* Juratzka.

Leaves from ovate or ovate-lanceolate base gradually acuminate acute, faintly reflexed to above middle; nearly all cells short; costa percurrent. Capsules unknown. — *Alp. rocks r. Eur.* Austria: Breidler. Switzerl.: Pfeffer. Norway: Zetterstedt; Hagen; E. Nyman. *Amer.* »Greenl.: Berggren.

VI. *Leptodontium* Hampe.

A. Leaves broadly limbate all around by pale cells, denticulate nearly all around, papillose.

32. *D. recurvifolius* Taylor. — *Bryum* Tayl.; *Didymodon* Wilson.

Leaves ovate-oblong obtusate subobtusate not reflexed, spreading when moist; costa short-excurrent. Capsules unknown. Tufts blackish brown 2—10 c. m. high. — *Wet rocks r. Eur.* Engl.: Holt.

B. Leaves not or indistinctly limbate, entire below middle.

a. Leaves papillose and reflexed; costa not percurrent.

33. *D. flexifolius* Dickson. — *Bryum* Dicks.; *Didymodon* Hooker et Taylor.

Leaves oval-oblong or lingulate, obtusate acute or apiculate, dentate above middle or in upper third, reflexed at both sides, spreading when moist. Capsule cylindric; teeth fugacious sometimes entire; pedicel pale yellow. Stem 1—3 c. m. high. — Bare gravelly and turfy places in warmer districts *r. Eur.* Engl.: Boswell. France: Husnot.

34. *D. styriacus* Juratzka.

Differs from the last: Leaves narrower, sparingly dentate near apex, reflexed at one side, patent when moist; lower basal cells gen. wider. Capsules unknown. — *Alp. rocks r. Eur.* Austria: Breidler.

b. Leaves papillose not reflexed; costa sometimes excurrent.

35. *D. gemmascens* Mitten. — *Leptodontium* Braithwaite; »*Streptopogon* Mitten»: Braithw.

Leaves broadly ovate-lanceolate acuminate acute, distantly dentate above, spreading or claviculiform when moist; costa short-excurrent with propagula at apex. Stem 2—5 c. m. high. Capsules unknown. — »On thatched roofs» *r. Eur.* Engl.: Davies, com. W. H. Pearson.

36. D. Helmii Hedwig. — *Gymnostomum* H.; *Didymodon* Kindb.; *Pottia Fuernrohr*.

Leaves lanceolate or sublingulate, the upper long-acuminate acute, densely serrulate above, not spreading; costa us. not excurrent. Capsule short subcylindric or oval-oblong; lid systylic; peristome none; pedicel red. Stem 1—2 c. m. or lower. Monoecious or synoecious. — Wet soil often near sea sometimes in alps. — *Eur.* not uncommon. Sweden, Norway! Spetsbergen: Berggren. *Amer.* Can.: J. Macoun; Drummond; Waghorne. Alaska: J. M. Macoun.

* **D. Ryani** Philibert. — *Pottia* Phil.; *Didymodon* Kindb.

» Leaves very small, oval or short-oblong, very obtuse and entire. Lid of capsule short and thick. — *Eur.* Norway: Ryan; Philibert revue bryol. 1896.

37. D. helmifoides Kindb. — *Pottia* Kindb. cat. Can. m.

Leaves suboblong, the lower obtuse, the upper short-acuminate acute; costa gen. excurrent. Capsule cylindric longer and narrower than in the last; peristome present but rudimentary; pedicel golden yellow. Stem only 2—3 m. m. high. Otherwise as the last. — Earth in alps r. *Amer.* Can. Rocky mts: Macoun.

c. Leaves smooth distantly dentate or denticulate.

38. D. riparius Austin. — *Pottia* Aust.; Sulliv. icon. m.; *Didymodon* Kindb.; *Barbula lingulata* Warnstorff; *Trichostomum Warnstorffii* Limpricht.

Leaves oval-oblong or lingulate obtuse sometimes apiculate, sparingly denticulate near apex sometimes to $\frac{1}{4}$, patent when moist; only the lowest basal cells rectangular; costa not or scarcely percurrent. Capsule oblong-cylindric; peristome unknown; annulus broad. Stem to 3 c. m. high, sometimes with propagula. — Wet rocks near water r. *Eur.* Switzerl.: Weber; Culmann, com. Husnot. *Amer.* U. S.: Austin, com. Mrs Britton.

39. D. Macounii Kindb. (new name). — *Leptodontium canadense* Kindb. cat. Canad. m.

Leaves lanceolate or narrowly oblong-lingulate acute, coarsely dentate at least in upper half, spreading when moist; lower basal cells rectangular; costa percurrent or short-excurrent. Stem scarcely 1 c. m. high. Capsules and male plants unknown. — Stones in rivers r. *Amer.* Can.: J. Macoun.

VII. Hydrogonium C. Mueller.

40. **D. Ehrenbergii** Lorentz. — *Trichostomum* Lor.; *Didymodon* Kindb.; *Trichostomum* (*Hydrogonium*) *mediterraneum* C. M.

Leaves sublinear or ovate-lanceolate subobtuse not (or indistinctly near base) reflexed, patent when moist; basal cells narrow hyaline, the others smooth subpellucid sparingly chlorophyllose; costa not or scarcely excurrent. Capsules unknown. Stem often 3—6 c. m. high. — Wet calcareous rocks r. *Eur.* »France: Taxis»: Boulay (*Africa*, Alger: Debat; Philibert).

116. **Pottia** Ehrhart.

A. Leaves smooth with hyaline cells. Paroecious.

1. **P. venusta** Juratzka.

»Upper leaves long obovate-oblong spathulate short-acuminate not reflexed; costa excurrent. Capsule oval-cylindric; teeth none; annulus double persistent. — *Eur.*: Schimper (»Asia island Cyprus: Unger»: Jur.).

2. **P. pallida** Lindberg.

»Leaves recurved near middle, shorter than in the last. Capsule oval-oblong; annulus none. Smaller than the last. — *Eur.* r. Spain: J. Lange»: Schimper.

B. Leaves often papillose; cells more or less chlorophyllose.

a. Paroecious. Leaves us. reflexed and papillose; costa long-excurrent.

3. **P. crinita** Wilson.

Leaves broadly oblong-lingulate obtusate often obtuse, papillose and reflexed. Capsule us. suboval; teeth wanting or rudimentary; pedicel orange; calyptra us. smooth — Moist banks and rocks near sea r. *Eur.* Engl.: Ralfs.

* **P. viridifolia** Mitten; Braithwaite.

Lower leaf-cells shorter, the upper smaller. Peristome none. — Rocks near sea r. *Eur.* Irel.: Stewart. France: Le Jolis.

* **P. asperula** Mitten; Braithwaite.

Leaf-cells as in *P. crinita* **viridifolia*. Peristome none. Calyptra scabrous. — *Eur.* r. Engl.: Curnow.

* **P. Wilsoni** Hooker. — *Gymnostomum* Hook.; *Pottia* Br. eur.

Lower leaf-cells long narrow, the upper very small. Capsule narrower; teeth rudimentary. Calyptra scabrous. — Sandy rocky ground r. *Eur.* France: Lamy. Engl.: Curnow. *Amer.* »U. S.»: Lesq. et Jam.

4. **P. cuneifolia** Solms Laubach.

Lower leaves linear-oblong, the upper longer and spathulate-oblong subobtuse smooth r. reflexed. Capsule oval-oblong

small; teeth indistinct; pedicel reddish. Plants small. — *Eur.* r. Portugal: Solms Laubach, com. Venturi.

5. *P. Notarisii* Schimper.

Differs from *P. crinita*: Leaves smaller narrower; upper cells scarcely chlorophyllose. Capsule oblong-cylindric longer narrower and longer-pedicellate. — *Eur.* r. Sardinia: F. Mueller*: Schimp. syn.

b. Monoecious. Leaves often smooth and not reflexed. Pedicel reddish.

6. *P. truncatula* L. — Bryum L.; Pottia Lindb.; P. truncata Fuernrohr.

Leaves subobovate acute or short-acuminate smooth not reflexed; costa not long-excurrent. Capsule short cupuliform or subhemispheric; teeth none. — Earth in fields and gardens. *Eur.* common. Sweden! France: Husnot. *Amer.* Can.: Macoun. U. S.: com. Macoun.

7. *P. lanceolata* Hedwig. — Leersia H.; Pottia C. M.

Leaves oblong-lingulate acute obtusate or short-acuminate, us. reflexed and more or less papillose; costa often long-excurrent. Capsule oblong-oval; teeth often well-evolute. — On earth. *Eur.* not r. Switzerl.! Sweden: S. Hardin. France: Puget. Italy: Arcangeli.

*** *P. littoralis* Mitten; Braithwaite.**

Leaves nearly smooth; costa shorter-excurrent. Peristome none. — Sandy soil near sea r. *Eur.* Engl.: Rogers. *Amer.* Can.: Macoun.

*** *P. intermedia* Turner. — Gymnostomum Turn.; Pottia Fuernrohr.**

Leaves faintly papillose sometimes slightly reflexed; costa short-excurrent. Capsule gen. subcylindric; teeth none or rudimentary. — Banks and walls. *Eur.* not r. Sweden! France: Brébisson. *Amer.* r. Can.: Macoun.

117. *Dermatodon* Huebener.

1. *D. cernuus* Huebener. — Desmatodon Br. eur.; Cynodontium latifolium Schwægrichen.

Leaves oblong sublingulate sharply acuminate acute limbate papillose, reflexed at least to middle, us. denticulate near apex; costa excurrent finally reddish. Capsule broad-ovate inclined or horizontally patent with erect neck, finally red-brown; teeth long us. deeply cleft; lid apiculate; pedicel straight yellow finally red 10—16 m. m. long. Spores about 0.04 m. m. Tufts dense to 2—3 c. m. high, often lower. Monoecious.

— Calcareous stones and walls or (in Amer.) on earth, not common. *Eur.* Switzerl. Austria: Broidler. Norway: Zetterstedt. *Amer.* Can.: Macoun; Drummond 114.

* **D. xanthopus** Kindb. — *Desmatodon* Kindb. cat. Can. m.

Leaves less chlorophyllose; costa greenish. Capsule larger; teeth more united; pedicel yellow not red. — On earth r. *Amer.* Can.: Macoun.

2. **D. camptothecius** Kindb. — *Desmatodon* cat. Canad. m.

Differs from *D. cernuus*: Leaves narrower and longer, sub-obtuse gen. entire, nearly smooth, reflexed only rear base; costa greenish. Capsule arcuate pale brown or pale red; teeth short cut in 2—4 partly cohering segments; lid with oblique beak; pedicel flexuous arcuate when young, reddish yellow. — Rocks near Atlantic sea r. *Amer.* Can.: Macoun; Waghorne.

118. *Weisia* Ehrhart.

A. Leaves long narrow, serrate at the broad base, at least the perichetial. Dioecious. Stem us. high.

I. **Euladium**. Capsule long-exserted; lid deciduous; teeth more or less cleft; annulus persistent or indistinct. Leaves not recurved, gen. faintly crisped when dry; cells pellucid; costa excurrent.

B. Leaves broad entire crisped. Monoecious or paroecious.

II. **Pseudo-Pottia**. Capsule long-exserted; teeth often present; lid deciduous. Leaves concave often recurved; upper cells small; costa sometimes excurrent. Habit of *Pottia*. Stem low.

C. Leaves entire narrow gen. sublinear.

a. Leaves often involute us. crisped; costa often excurrent. Stem low. Often monoecious.

III. **Astomum**. Capsule not emerging above upper leaves; lid persistent or loosed with difficulty; teeth none. Stem very short.

IV. **Hymenostomum**. Capsule long-exserted; lid deciduous; teeth none. Leaves crowded; costa excurrent. Monoecious.

V. **Eu-Weisia**. Capsule long-exserted; lid deciduous; teeth present at least rudimentary, us. entire. Leaves crowded; costa sometimes not excurrent.

b. Leaves not involute and not or slightly crisped; costa not excurrent. Dioecious. Stem often high.

VI. **Hymenostylium**. Capsule without peristome; lid systylic; annulus none. Leaves partly recurved; upper cells more or less pellucid.

VII. Gymnostomum. Capsule sometimes but r. with peristome; lid deciduous not systylic; annulus often present. Leaves sublinear not recurved; cells gen. subquadrate, the upper us. opaque and very small.

I. *Eucladium* Br. eur.

1. *W. verticillata* L. — *Bryum* L.; *Weisia* C. Mueller.

Leaves carinate brittle from short ovate base somewhat abruptly narrowed to the nearly subulate acumen; inner basal cells much larger than the outer. Capsule brownish suboblong; teeth cleft or perforated. Tufts eradiculose us. encrusted with calcareous deposite. R. fruiting. — Dripping calcareous or sandstone rocks. *Eur.* princ. in southern distr. not r. Switzerl.! Sweden very r.! Spain: Levier; Dieck, com. Roell. Greece: Heldreich. *Amer.* r. Can.: Macoun.

II. *Pseudo-Pottia* Kindb.

A. Leaves not recurved. Peristomial teeth well-evolute more or less perforated; annulus distinct. Monoecious.

2. *W. caespitosa* Bruch. — *Pottia* C. M.; *Trichostomum* Jur.

Leaves suboblong acute or short-acuminate; basal cells small short-rectangular; costa short-excurrent. Capsule subovate small-mouthed us. twice longer than the rostellate lid; pedicel yellow. Often loosely tufted. — Bare calcareous soil in warmer distr. r. *Eur.* France: Philibert; Brébisson. Germany: Schemmann.

B. Leaves recurved. Peristome us. imperfect or wanting; annulus not distinct. Paroecious.

3. *W. Starkei* Hedwig. — *Pottia* C. M.

Leaves subobovate-oblong or narrower, acute or short-acuminate, recurved nearly all around; basal cells rectangular; costa gen. excurrent. Capsule oval-oblong, lid short thick subconic or obtuse; pedicel us. yellowish. Us. not tufted. Smaller than the last. — Fallow fields and banks. *Eur.* not r. Sweden: Hamnström. France: Bouvet. Greece: Heldreich. *Amer.* r. »U. S.»: Lesq. et Jam.

*** *W. Davallii*** Smith. — *Gymnostomum* Sm.; *Weisia* Kindb.; *Pottia minutula* Br. eur.

Capsule subovate; teeth none; pedicel reddish. Leaves often rufescent when old. Very small. — *Eur.* not r. Sweden, Switzerl.! *Amer.* r. »U. S.»: Lesq. et Jam.

*** *W. mutica*** Venturi. — *Pottia* Vent.; *Weisia* Kindb.

Leaves with subpercurrent costa. Peristome rudimentary. — Dolomitic rocks r. *Eur.* Switzerl.: Mari.

* **W. commutata** Limpricht. — *Pottia* Limpr.; *Weisia* Kindb.

»Capsule often inclined; teeth very short. Leaves narrower reflexed, sometimes suboval subobtuse. — Calcareous soil r. *Eur.* Istria: Weiss: Limpricht.

4. **W. groenlandica** Kindb. in *Hedwigia* 1897 p. 65.

Leaves suboblong-linear or sublingulate very obtuse, only the uppermost recurved; cells nearly smooth; costa not percurrent. Capsule oblong; lid long-conic much shorter; teeth none; pedicel reddish. — Habit of *W. Starkei*. — Arctic distr. r. *Amer.* Greenl. Silch: Baur 1885, com. Roell.

III. *Astomum* Hampe (*Systegium* Schimper).

A. Leaves channelled not involute.

a. Leaves with long-excurrent costa, crisped.

5. **W. Levieri** Limpricht. — *Astomum* Limpr.; *Weisia* Kindb.

Comal leaves and the outer perichetial long-subulate much larger than in *W. crispa*; inner perichetial short-acuminate much shorter. Capsule globose-oval; pedicel very short; lid rostrate. — Clay soil r. *Eur.* Italy: E. Levier.

b. Leaves with subpercurrent costa.

6. **W. multicapsularis** Smith. — *Phascum* Sm.; *Weisia* Mitten.

Lower leaves distant; comal and perichetial larger, long-acuminate subulate, crisped; costa not or slightly excurrent. Capsule subglobose or oval-oblong, not much longer than pedicel. — Clay fields r. *Eur.* »Engl.»: Braithwaite.

7. **W. Mittenii** Bruch et Schimper. — *Astomum* B. S.; *Weisia* Mitt.

Lower leaves distant; the uppermost larger, subulate, shorter-acuminate than in the last, not or faintly crisped; costa not excurrent. Capsule subglobose; pedicel somewhat longer. — Clay fields and banks r. *Eur.* »Engl.»: Braithwaite.

8. **W. rostellata** Bridel. — *Phascum* Brid.; *Weisia* Lindb.

Leaves crowded long-acuminate acute not distinctly subulate, crisped; costa short-excurrent. Capsule oval-oblong; pedicel 2—3 times longer. — On earth r. *Eur.* Engl.: Rogers. France: Sebillès, com. Husnot.

B. Leaves involute gen. carinate and long-acuminate, crisped.

a. Leaves with gen. long-excurrent costa: the lower distant.

9. **W. crispa** Hedwig. — *Phascum* H.; *Weisia* Mitten.

Comal and perichetial leaves long-subulate. Capsule subglobose; pedicel shorter; lid us. with short beak. — Clay or sandy soil. *Eur.* not r. Switzerl.! Sweden: Lindberg; S. Hardin. *Amer.* Can.: Drummond n. 11, com. Macoun.

b. Leaves long-acuminate with subpercurrent costa, the lower distant. Capsule with rostellate lid.

10. **W. Sullivanii** Schimper. — *Astomum* Sch.; Sull. icon. m.; *Weisia* Kindb.

Capsule globose; pedicel shorter. — Clover-fields r. *Amer.* U. S.: Sullivan, com. C. Mueller; Mohr, com. Macoun.

11. **W. nitidula** Schimper. — *Astomum* Sch.; *Weisia* Kindb.

»Capsule ovoid; pedicel much longer. — *Amer.* r. U. S.: Sullivan icon. m.

* **W. Drummondii** Kindb. — *Systegium* cat. Can. m.

Capsule subglobose; pedicel 3—4 times longer, nearly emerging above upper leaves. — *Amer.* r. Can.: Drummond, com. Macoun.

c. Leaves crowded: upper long-acuminate, lower short-acuminate; costa subpercurrent. Capsule with thick short obtuse point.

12. **W. Ludovicæ** Sullivant. — *Astomum* Sull. ic. m.; *Weisia* Kindb.

Capsule suboval; pedicel often somewhat longer. — *Amer.* r. U. S.: Sullivant.

IV. *Hymenostomum* R. Brown.

A. Pedicel short. Stem finally decumbent. Leaves not involute.

13. **W. squarrosa** Esenbeck et Hornschuch. — *Hymenostomum* Es. et Hornsch.; *Weisia* C. M.

Capsule with somewhat small mouth. Plants very small. — Clay fields and banks r. *Eur.* France: Husnot. Germany: Dreesen.

B. Pedicel elongate. Stem erect. Leaves involute.

14. **W. microstoma** Hedwig. — *Gymnostomum* H.; *Weisia* C. M.

Leaves us. not strongly involute above; costa pale faint. Capsule with very small mouth, often asymmetric. — Banks and barren fields. *Eur.* not uncommon. Sweden, Spain etc.

15. **W. tortilis** Schwægrichen. — *Gymnostomum* Schw.; *Weisia* C. M.

Leaves less involute; costa stout finally brown. Capsule symmetric with somewhat wide mouth. — Limestone rocks and walls r. *Eur.* Switzerl. France: Boulay. Engl.: Rogers.

V. *Eu-Weisia*.

A. Perichetial leaves obtuse short convolute. Other leaves with not distinctly excurrent costa, not involute.

16. **W.convoluta** C. M. et Kindb. cat. Can. m.

Leaves sublinear-subulate. Capsule gen. narrow; beak shorter. — Crevices of rocks princ. in alps r. *Amer.* Can. Rocky mts 2300 metr. a. sea, Vanc. isl. and Peace river: Macoun.

B. Perichetial leaves acute not convolute. Other leaves with excurrent costa.

17. **W.viridula** L. — Bryum L.; Weisia Hedwig.

Leaves from subovate base acuminate, strongly involute, only the lowest with flat borders; costa pale, papillose at back. Capsule us. suboval with shorter beak; pedicel yellow. — On earth, often on walls and roadsides. *Eur.* common in lower districts. Sweden, Switzerl. *Amer.* Can.: Macoun; Drummond 67. U. S.: Sullivant, com. C. Mueller.

* **W.longirostris** Kindb. in Hedwigia 1896 p. 59.

Capsule more wide-mouthed, gen. shorter than beak; teeth gen. rudimentary. — *Amer.* r. U. S. Chicago: Roell.

* **W.crispata** Esenbeck et Hornschuch; Gymnostomum Es. et Hsch.; Weisia Juratzka.

Capsule more small-mouthed, suboblong, r. longer than beak; teeth rudimentary. — Clay and calcareous soil. *Eur.* Switzerl. Sweden: J. Persson.

* **W.longiseta** Lesquereux et James.

Leaves larger, more hyaline at base. Peristomial teeth often cleft. Tufts gen. more dense. — R. *Eur.* Engl.: Rogers. *Amer.* U. S.: Mohr, com. Macoun; Langlois, com. Cardot.

18. **W.Wimmeri** Sendtner. — Gymnostomum Sendt.; Weisia Br. eur.

Differs from *W. viridula* in suboblong leaf-base and parocious inflorescence. Peristome us. rudimentary. — Earth in alp. regions r. *Eur.* Norway! Switzerl.; Schimper.

19. **W.rutilans** Hedwig. — Gymnostomum H.; Weisia Lindb.; *W. mucronata* Br. eur.; *W. Wolfii* Lesq. et Jam.

Differs from *W. viridula* in nearly all leaves flat at borders. Capsule us. suboval; beak shorter; pedicel orange about 1 c. m. long. — Clay soil r. *Eur.* Engl.: Barnes, com. Bottini. Italy: Roell. *Amer.* Can. Ottawa and Vanc. isl.: Macoun. U. S.: Wolf, com. C. Mueller.

* **W.Ganderi** Juratzka.

Capsule oblong scarcely longer than beak. — *Eur.* r. Switzerl. France: Philibert.

VI. *Hymenostylium* Bridel.

20. *W. curvirostris* Ehrhart. — *Pottia* Ehrh.; *Weisia* C. M.; *Gymnostomum* Hedwig.

Leaves long narrowly ovate-lanceolate or sublinear acuminate acute carinate, more or less papillose; the upper sometimes falcate; cells often faintly yellowish or less pellucid, rectangular or subquadrate; the lower basal cells hyaline sometimes rhomboidal. Perichetial leaves costate nearly similar. Capsule red-brown subglobose or obovate; beak longer and oblique. Tufts radiculose often high, sometimes loosely cohering. — Calcareous and schistose rocks princ. in alps. *Eur.* not uncommon. Sweden, Norway, Switzerl. *Amer. Can.*: Macoun; Waghorne. U. S.: Demetrio, com. Cardot.

21. *W. platyphylla* Kindb. — *Gymnostomum* Kindb. bull. Torr. club 1889.

Leaves oblong-lanceolate obtusate obtuse nearly smooth concave or channelled, shorter and broader than in the last; cells pellucid somewhat large: the upper subquadrate, the inner basal rectangular hyaline. Perichetial leaves ovate, the inner not or indistinctly costate. Capsules unknown. Tufts not high nearly eradiculose. — Rocks r. *Amer. Can. Brit. Col.* near a waterfall: Macoun.

VII. *Gymnostomum* Hedwig.

A. Tufts compact. Stem somewhat elongate. Capsule with indistinct or narrow persistent annulus; peristome none; pedicel yellow.

22. *W. rupestris* Schleicher. — *Gymnostomum* Schl.; *Weisia* C. M.

Leaves carinate often acuminate, acute or obtuse, not or faintly curved when moist, somewhat long; costa not percurrent. Perichetial leaves nearly similar not sheathing. Capsule oblong finally pale yellow, at least twice longer than the conic beak; annulus none. Tufts often high us. brown-green. — Rocks princ. siliceous. *Eur.* not uncommon. Sweden, Norway, Switzerl. *Engl.*: Holt. *Amer. Can.*: Macoun; Waghorne; Drummond 24. **23. *W. calcarea*** Esenbeck et Hornschuch. — *Gymnostomum* Es. et Hornsch.; *Weisia* C. M.

Leaves channelled or indistinctly carinate above, obtusate or short-acuminate, acute or obtuse, not or faintly curved when moist, not long; costa not percurrent. Perichetial leaves larger and longer with long sheathing base and shorter, attenuate acumen; the inner shorter. Capsule oval-oblong yellowish; lid

short with conic beak; annulus narrow. Tufts us. light green mostly encrusted by chalk, lower than in the last. — Calcareous rocks. *Eur.* not uncommon in southern distr. Switzerl. France: Philibert. Spain: Levier. Italy: Arcangeli. *Amer.* r. Can.: Macoun; Waghorne.

24. **W. falcata** Kindb. bull. soc. bot. ital. 1895.

Differs from the resembling last: Upper leaves distinctly ciliate somewhat long-acuminate and gen. acute, falcate when moist; costa gen. percurrent. Inner perichetial leaves long-acuminate not or indistinctly sheathing. Lid of capsule nearly flat. Tufts dark green less compact. — Calcareous rocks r. *Eur.* Italy monte Caprino near Lugano: Roell and Kindb.

B. Tufts loose very low. Capsule minute; annulus us. broad. Leaves channelled. Plants small.

a. Lower leaves not shorter than the upper; cells pellucid, the upper nearly smooth well-distinct.

25. **W. Barbula** Schwægrichen. — *Gymnostomum* Schw.; *Weisia* Kindb.; *Hyophila* Hampe; *Pottia* C. M.

Leaves not long, obtusate gen. obtuse, not or faintly curved when moist. Perichetial leaves nearly similar not sheathing; the innermost one from short base somewhat narrowed to a long linear obtuse at one side faintly reflexed acumen. Capsule long cylindric; beak short; teeth none; annulus broad loosed in pieces. — Rocky banks of mountain rivulets r. *Amer.* U. S.: Garber; Lesq. et Jam. (Cuba: Wright, herb. Sullivan, com. C. Mueller).

b. Lower leaves shorter than the upper; upper cells opaque very small. Leaves often curved when moist.

aa. All leaves short; costa not percurrent. Capsule with broad annulus.

26 **W. tenuis** Schrader. — *Gymnostomum* Schrad.; *Weisia* C. M.; *Gyroweisia* Schimper.

Leaves sublingulate arrouded at apex not acuminate. Perichetial leaves larger and longer with long sheathing base and sublinear obtuse shorter acumen. Capsule oblong; lid conic much shorter; teeth none; annulus often revoluble. Stem often with shoots at base; their leaves smaller and shorter. — Limestone and sandstone rocks princ. in warmer districts. *Eur.* less r. Sweden, Switzerl. France: Lamy. Engl.: Cunliffe. *Amer.* r. Can.: Drummond 21; White, com. Macoun.

* **W.reflexa** Bridel. — *Gyroweisia* Schimper.

Peristome present us. rudimentary. Leaves more curved. — *Eur. r. France*: Camus, com. Husnot.

27. **W.acutifolia** Philibert. — *Gyroweisia* Phil.; *Weisia* Kindb. »*Gyroweisia tenuis*»: Limpricht.

Leaves not arrounded at apex; the upper sometimes acute, not much longer than the lower. Perichetial leaves acuminate acute. Capsule suboval twice longer than beak; teeth none; annulus revoluble. — Caverns of calcareous rocks *r. Eur. Switzerl.*: Philibert.

28. **W.pusilla** Kindb. *revue bryol.* 1896. — »*Gymnostomum tenue*»: Kindb. *cat. Canad. m.*

Leaves obtusate subacute not arrounded at apex. Perichetial leaves not larger and not sheathing, the inner one subovate shorter. Capsule oblong, not longer than beak; teeth none or rudimentary; annulus not revoluble. Resembles *W. tenuis* in size. — Calcareous rocks *r. Amer. Can. Owen Sound*: Macoun.

bb. Leaves acute; the lower oval very small, the upper very much longer (about 4 m. m.); costa subexcurrent. Annulus of capsule not found.

29. **W.linealifolia** Kindb. — *Gyroweisia* Kindb. *revue bryol.* 1892 and *Nuovo giorn. bot. ital.* 1893.

Upper leaves somewhat broader at base, crenulate-papillose all around; costa subexcurrent. Perichetial leaves from broader base abruptly tapering to a sublinear by costa nearly filled acumen. Capsule oblong-cylindric; teeth none; lid long-rostrate; pedicel pale finally reddish. Stem with shoots at base as in *W. tenuis*. — Calcareous rocks *r. Eur. Switzerl.* in a cavern near Luganol

119. **Syrrhopodon** Schwægrichen.

1. **S.texanus** Sullivant *icon. muscorum.*

Leaves hyaline-limbate and serrulate nearly all around, sublinear acute or obtuse; nearly all basal cells large hyaline, the others very small opaque; costa with 2 serrate lamellæ near apex. Calyptra scabrous. Peristomial teeth with 2 or 3 articulations. Tufts dark green or blackish. — *Amer. r. U. S. south. st.*: Sawyer, com. Cardot.

2. **S.crispus** Austin. — *Calymperes* Lesq. et Jam.

»Leaves hyaline-limbate in lower part, papillose-crenulate above, narrowly panduriform or lingulate, obtuse; basal cells larger, the upper very small. Tufts compact yellowish green, brown inside. — *Amer. r. U. S. Florida*»: Lesq. et Jam.

3. **S. floridanus** Sullivant icon. musc.

Leaves not limbate, entire at the lower part of sheath, papillose-crenulate in its upper part, narrowly ovate-lanceolate, tapering to the subobtuse apex; upper lamina furnished with 2 serrate lamellæ at each border; the most cells small dusky, only the lower basal large hyaline; costa papillose, not serrate, at back. Calyptra smooth. Peristomial teeth with 5—6 articulations. Pedicel of capsule shorter than in the last. Tufts brown-green. — Decayed logs r. Amer. r. U. S. south. st.: Fitzgerald, com. Renauld.

120. **Dialytrichia** (Schimper as subgenus) Limpricht.

1. **D. Brebissoni** Bridel. — *Barbula* Brid.; *Dialytrichia* Limpr.; *Cinclidotus* Husnot; *Tortula mucronata* Lindb.

Leaves broad somewhat long sublinear or sublingulate round-obtuse carinate with thickened borders above the hyaline slightly reflexed base; upper cells papillose subquadrate, the basal rectangular hyaline or faintly colored; costa thick short-excurrent. Capsule suboblong; lid rostellate much shorter; teeth short reddish papillose scarcely once contorted; basal tube short; pedicel yellowish red. Stem branched 2—5 c. m. high us. erect. Tufts large dark green or dirty brownish. Habit of *Cinclidotus riparius*. — Base of trees near rivers or stones in rivulets r. Eur. Italy! France: Husnot. Belgium: Roemer. Spain: Bolos, com. Venturi. 2. **D. cancellata** C. M. — *Barbula* C. M.; *Dialytrichia* Kindb.

Differs from the last: »Leaves yellowish green; stem nearly simple. Capsule cylindric; lid scarcely shorter; teeth smooth; calyptra very rough. — Amer. r. U. S. Texas: Boll: C. M. in Flora 1873.

121. **Cinclidotus** Beauvois.

A. Leaves narrow long sublinear or nearly subulate, falcate when moist.

1. **C. aquaticus** Jacquin. — *Hypnum* Jacq.; *Cinclidotus* Br. eur.

Leaves crowded entire channelled narrowed from base, faintly curved when dry; nearly all inner cells subquadrate faintly pellucid, the marginal short-rectangular; costa thick sublinear excurrent to a thick smooth point, occupying about $\frac{1}{4}$ of lamina at base. Capsule oblong brown; lid subconic often nearly as long; teeth brittle partly loosed with difficulty; pedicel short-exserted. Tufts brown or dark green. Stem naked below and much branching, often very long to 50 c. m. — Rivulets. Eur. southern distr. somewhat r. Switzerland, Schimper. Austria: Venturi. Italy: Arcangeli. Germany: Kolb.

2. **C. falcatus** Kindb. revue bryol. 1887.

Differs from the last: Leaves less crowded and dark green, distinctly falcate also when dry; cells opaque very chlorophyllose; costa broader and gradually narrowed, occupying at least $\frac{1}{8}$ of lamina at base, much narrower at apex and gen. not excurrent. Stem not naked below, divided in long branches. Capsules unknown. — Springs r. *Eur.* Greece: Heldreich.

B. Leaves broad obtusate or broadly acuminate, patent when moist; lower cells short rectangular.

3. **C. riparius** Host. — *Gymnostomum* Host; *Cinclidotus* Arnott.

Leaves concave entire sublinear-oblong or sublingulate gen. obtusate obtuse; upper cells smooth. Capsule oblong; teeth yellowish rudimentary; pedicel short-exserted. Stem 2—8 c. m. long sparingly branching often erect. Tufts blackish. — Stones princ. in rivers, r. *Eur.* Germany: Holler. France: Guépin, com. Husnot. Sweden: P. Olsson. Spain: Dieck, com. Roell.

4. **C. fontinaloides** Hedwig. — *Trichostomum* H.; *Cinclidotus* Beauvois.

Leaves carinate sometimes denticulate at apex, ovate-oblong or broadly ovate-lanceolate acuminate gen. acute; upper cells sometimes faintly papillose. Capsule oval nearly immersed; teeth reddish. Stems fasciculate often to 10—15 c. m. long with numerous short branchlets. Tufts olivaceous or brown. — Stones in springs and rivulets *Eur.* not r. in lower warmer districts, r. in alps. Sweden, Switzerl., Italy! *Amer.* r. »Can.: Macoun»: Lesq. et Jam.

Fam. 25. **Calymperaceæ.**

122. **Calymperes** Swartz.

1. **C. Richardi** C. Mueller.

»Leaves yellow-limbate at least in lower part, suboblong obtuse; costa not excurrent. Calyptra slightly scabrous. Tufts loose»: C. M. — Trees r. *Amer.* »U. S. Florida»: Lq. et Jam.

2. **C. disciforme** C. Mueller.

»Leaves yellow-limbate suboblong; costa excurrent. Calyptra very scabrous. Tufts pulvinate. Barren branches with short crowded leaves»: C. M. — *Amer.* r. »U. S. Florida»: Lq. et Jam.

Fam. 26 **Encalyptaceæ.**

123. **Encalypta** Schreber.

A. Peristome double. Pedicel red.

1. **Streptotheca.** Capsule finally twisted, r. distinctly necked,

more or less ribbed; teeth red; endostome yellow; calyptra very long, fringed below. Leaves limbate cucullate lingulate.

II. **Diplolepis**. Capsule necked, neither twisted nor sulcate; endostome rudimentary adhering to teeth; calyptra us. fringed when young. Leaves not limbate.

B. Peristome simple or wanting. Monoecious.

a. Leaves not recurved. Capsule without distinct defluent neck; pedicel red.

III. **Rhabdotheca**. Capsule greenish or pale yellowish, sulcate when dry, often red-ribbed; peristome often present; calyptra not long, r. fringed. Leaves often limbate.

IV. **Pyromitrium**. Capsule pale brown not sulcate; peristome none; calyptra long, often fringed when young. Leaves limbate.

b. Capsule more or less distinctly necked; pedicel yellow in younger state. Leaves recurved.

V. **Xanthopus**. Capsule reddish r. sulcate, not ribbed; peristome us. present. Leaves not distinctly limbate.

I. **Streptotheca** Kindb.

A. Capsule very much twisted also when unripe. Leaves obtusate obtuse; costa hispid above at back, not excurrent. Spores about 0,01 m. m.

1. **E. contorta** Wulfen. — *Bryum* Wulf.; *Encalypta* Lindb.; *E. streptocarpa* Hedwig.

Outer perichetial leaves from broad base abruptly tapering to a long sublinear obtuse acumen; the inner shorter with short acute acumen. Pedicel faintly rough. Calyptra hispid at beak. Sterile stems often with propagula. Dioecious r. fruiting. — Rocks princ. calcareous. *Eur.* not uncommon. Sweden, Norway, Switzerland. Austria: C. E. Kindberg. *Amer. Can.*: Macoun.

2. **E. cucullata** C. M. et Kindb. l. c.

Perichetial leaves gradually long-acuminate acute with long hairpoint. Pedicel smooth. Calyptra hispid on the whole surface. Stem without propagula. Monoecious. — Crevices of alp. rocks r. *Amer. Can. Brit. Col.*: Macoun.

B. Capsule faintly twisted, straight when unripe; pedicel smooth; calyptra hispid at beak. Upper leaves acute; costa smooth often excurrent. Spores 0,02 m. m. Monoecious.

3. **E. procera** Bruch.

Upper leaves gen. acute, sometimes with hairpoint; the perichetial subovate short-acuminate us. with hairpoint. Capsule without distinct neck; teeth us. shorter than endostome. —

Schistose rocks in alp. region r. *Eur.* Norway! *Amer.* Can.: Macoun; Drummond 48.

4. *E. Selwyni* Austin.

Leaves more recurved than in the last; the upper and perichetial longer-acuminate with long hairpoint. Capsule sometimes with distinct neck and more twisted; endostome less papillose, as long as teeth. — Alp. rocks r. *Amer.* Can. Pacif. distr.: Macoun. U. S.: Roell.

II. *Diplolepis* Kindb.

A. Capsule not or scarcely longer than neck.

5. *E. longicolla* Bruch; Husnot m. Gall.

Leaves long narrow sublinear-lingulate obtuse or acute, concave not recurved; costa excurrent to a short yellowish point. Perichetial leaves long, the inner not smaller, with long whitish hairpoint. Capsule brown with red neck; teeth purplish. Spores 0,05—0,09 m. m. Calyptra long fringed nearly glabrous. — Calcareous soil in alp. region r. *Eur.* »Austria, Switzerl., Germany»: Schimper.

B. Capsule much longer than neck.

a. Leaves long narrow sublinear-lingulate; the perichetial ovate-oblong. Calyptra long hispid fringed when young.

6. *E. affinis* Hedwig fil.; Lindb. — *E. apophysata* Esenbeck et Hornschuch.

Leaves more or less acuminate often acute, not or indistinctly recurved; costa short-excurrent not piliform at apex. Capsule brownish; teeth pale red. Spores about 0,02 m. m. — Alp. rocks r. *Eur.* Switzerl. Sweden: Aongstroem. Austria: Breidler.

7. *E. longipes* »Mitten»: C. M. in herb. — »*E. Macounii*»: Britton.

Leaves gen. obtusate, distinctly recurved nearly all around; costa not excurrent. Capsule reddish brown; teeth brown-yellow. Spores about 0,03 m. m. — Clay banks in alp. region r. *Amer.* Can. Rocky mts 2250 metr. a. sea: Macoun; Drummond 50 c, com. C. Mueller.

b. Leaves somewhat broad and not long, oblong-lingulate or shorter; the perichetial us. subovate r. suboblong.

aa. Leaves distinctly recurved nearly all around; costa not excurrent without hairpoint.

8. *E. leiocarpa* Kindb. cat. Canad. m.

Leaves oblong-lingulate obtuse. Capsule brownish; teeth brown-yellow; calyptra faintly rough, not fringed. Spores about 0,02 m. m. — Alp. rocks r. *Amer.* Can. Brit. Col. 1800—1850 metr. a. sea: Macoun.

bb. Leaves not or indistinctly recurved; costa long-excurrent with hairpoint.

9. *E. brevicolla* Bruch.

Leaves oblong-lingulate acute sometimes slightly recurved, often serrate at apex, very concave; hairpoint whitish. Capsule red; neck distinct; teeth whitish; calyptra short glabrous fringed when young. Spores about 0,03 m. m. — Schistose rocks in alp. regions in northern districts r. *Eur.* Norway! Sweden: E. Adlerz.

10. *E. subbrevicolla* Kindb. n. sp.

Leaves oblong-lingulate obtusate undulate not recurved, entire gen. obtuse; hairpoint whitish. Perichetial leaves suboblong acuminate. Capsule brownish with very short neck; teeth whitish when moist, pale reddish when dry; calyptra somewhat long with hispid beak, fringed when young. — *Amer.* r. Can. northern Labrador: Macoun 1896.

11. *E. labradorica* Kindb. n. sp.

Leaves subovate obtuse or subacute entire not recurved; hairpoint whitish or at base yellowish. Capsule brownish with distinct neck; teeth brown-yellow; calyptra short faintly rough not fringed. — *Amer.* r. Can. northern Labrador: Macoun 1896.

III. *Rhabdotheca* C. Mueller.

A. Leaves not distinctly limbate.

12. *E. exstinctoria* Swartz. — *Mnium* Sw. 1781; *Encalypta* Sw. 1799; *Leersia vulgaris* Hedwig 1787; *Encalypta* Hoffm. 1795.

Leaves short subspathulate us. obtuse sometimes apiculate; costa not or r. excurrent with short hairpoint, us. without hairpoint. Capsule red-mouthed not ribbed, finally sulcate when dry; teeth wanting or rudimentary; pedicel elongate. Calyptra pale yellow not fringed, more or less hispid. Spores about 0,03 m. m. Tufts green low, radiculose only at base. — Clay or sand on walls and rocks. *Eur.* common at least below alps. Sweden! Italy: Arcangeli. Greece: Heldreich. *Amer.* r. Can.: Macoun; Waghorne.

*** *E. tenella* Kindb. in Hedwigia 1896 p. 65.**

Leaves shorter, suboval gen. arrounded at apex sometimes with long hairpoint. Capsule small; teeth wanting; pedicel not much emergent. Calyptra whitish nearly smooth very small. Plants very small. — *Amer.* r. U. S. Montana: Roell.

B. Leaves limbate below.

a. Tufts dense very radiculose, brown below, often high.

13. *E. rhabdocarpa* Schwægrichen.

Leaves suboblong or oblong-lanceolate obtusate us. subacute; costa often excurrent sometimes piliferous. Capsule us. red-ribbed and oblong-cylindric; teeth orange or purplish. Calyptra short hispid not fringed. Spores 0,04—0,05 m. m. — Calcareous and schistose rocks. *Eur.* common in alps. Sweden (also below alps), Norway, Switzerl. *Amer.* Can. not r.: Macoun.

* ***E. leiomitra*** Kindb. cat. Canad. m.

Capsule short suboblong; teeth nearly blunt; calyptra glabrous. Leaves short-lingulate; costa subpercurrent. Tufts low. — *Amer.* r. Can.: J. M. Macoun.

* ***E. leptodon*** Bruch. — *Leersia rhabdocarpa* **leucodonte*a Kindb. Laubm. Schwed. u. Norw.

Capsule less distinctly ribbed; teeth whitish often rudimentary or wanting. Leaves suboblong; costa not excurrent without hairpoint. — Rocks. *Eur.* not common. Norway! Sweden; M. Huss. Switzerl.: Roell.

b. Tufts less dense, radiculose only at base, green and not high. Costa of upper leaves long-excurrent with hairpoint.

14. *E. spathulata* C. Mueller.

Leaves oblong-spathulate us. obtuse. Peristome none. Calyptra fringed nearly glabrous. Capsule more or less sulcate. Spores 0,03—0,04 m. m. — Stones and walls r. *Eur.* Sweden! Austria Transsilvania: Barth, com. C. Mueller.

15. *E. subspathulata* C. M. et Kindb. l. c.

Leaves spathulate-lingulate obtuse. Capsule not ribbed, faintly sulcate when dry; teeth pale high or partly incomplete and membranose. Calyptra hispid above, not fringed. Spores 0,04—0,05 m. m. Tufts low not dense. — Earth r. *Amer.* Can. Brit. Col.: Macoun.

IV. *Pyromitrium* Wallroth.

16. *E. alpina* Smith 1805. — *E. commutata* Esenbeck et Hornschuch 1827.

Leaves deeply impressed at both sides above the short erect nearly sheathing base, sublingulate acute more or less attenuate; costa often excurrent. Perichetial leaves us. piliferous. Calyptra brownish glabrous. Spores 0,03—0,04 m. m. Tufts tomentose often high and brown. — Alp. rocks. *Eur.* common in northern districts, elsewhere r. Norway! *Amer.* r. Can. Rocky mts: Drummond 49.

V. *Xanthopus* Kindb.

A. Capsule not sulcate.

17. *E. ciliata* Hedwig. — *Leersia* H.; *Encalypta* Hoffmann.

Leaves lingulate subacute not long; costa nearly smooth at back, often excurrent to a yellowish point. Capsule with short less distinct neck and pale mouth; teeth orange erect when moist, appressed to mouth when dry, faintly papillose and us. brittle. Calyptra fringed also when old, us. glabrous r. rough at beak. Spores about 0,03 m. m. — Earth and stones also in alps. *Eur.* common. Sweden, Norway, Switzerl.! *Amer.* »Greenl.»: Berggren.

* *E. microstoma* Balsamo et Notaris.

»Capsule with narrow mouth and distinct neck; teeth irregular us. wanting. — Earth in alps r. *Eur.* Austria; Switzerl.»: Limpricht.

18. *E. Macounii* »Austin»: Macoun. — *Leersia borealis* Kindb. Laubm. Schwed. u. N.

Leaves gen. narrowly lingulate; costa longer-excurrent than in the last. Capsule with distinct often somewhat long neck and brown mouth; teeth brown-red or red, erect when dry, appressed to mouth when moist, distinctly papillose and not brittle. Calyptra as in the last. Spores about 0,04 m. m. — Rocks. *Eur.* in alp. regions not common. Norway! Switzerl.: Husnot m. Gall.; H. Forssell. *Amer.* Can. not r.: J. Macoun (also original specimen determined by Austin). Alaska: J. M. Macoun. U. S.: Roell.

B. Capsule distinctly sulcate when dry.

19. *E. alaskana* Kindb. cat. Canad. m.

Leaves short subobovate subobtuse; costa nearly smooth, scarcely excurrent. Capsule with very short neck and brown mouth; teeth as in the last. Spores about 0,02 m. m. Calyptra not seen. — Arctic district r. *Amer.* Alaska: J. M. Macoun.

124. *Merceya* Schimper.

1. *M. ligulata* Spruce. — *Encalypta* Spruce; *Merceya* Schimp.

Leaves lanceolate-lingulate cucullate arrounded at apex, reflexed below but not limbate, not or indistinctly papillose; upper cells small round-quadrate, the basal rectangular; costa not excurrent. Capsule oblong; teeth none; pedicel long. Stem simple or bifurcate. Tufts dense, brownish below, yellow-green at the tips, 2—4 c. m. high. — Wet rocks r. *Eur.* France: Renauld; Jeanbernard. Austria: Broidler.

2. *M. latifolia* Kindb. bull. Torr. club XVI.

Leaves broadly spatulate-lingulate obtusate obtuse or subacute, slightly reflexed near base, broadly limbate by orange-

colored larger cells, smooth; other cells as in the last; costa percurrent or scarcely excurrent. Capsules unknown. Stem divided. Tufts dense, brown-ferruginous below, green at the tips, about 3 c. m. high. Habit of *Barbula ruralis*. — Wet rocks r. Amer. Pacif. distr. Can. Vanc. isl. »U. S. Calif.» C. M. herb.

Fam. 27. **Orthotrichaceæ.**

125. **Orthotrichum** Hedwig.

A. Stomata of capsule superficial.

a. Leaves partly or wholly involute, not carinate. Dioecious.

I. Coelophyllum. Leaves short concave obtuse; cells gen. short. Capsule immersed sulcate strangulate when dry; calyptra scabrous; teeth reflexed when dry, broader than the cilia.

b. Leaves gen. carinate and recurved nearly all around, not crisped. Monoecious or (*O. exiguum*) dioecious.

II. Dorcadion. Capsule r. strangulate; calyptra us. hairy.

aa. Capsule narrow subcylindric not distinctly constricted, us. exserted.

1. Speciosa. Capsule nearly smooth at least when young; cilia narrow; teeth us. opaque and connate in pairs. Leaves carinate gen. long.

bb. Capsule thick oval-oblong strangulate and sulcate, us. immersed; cilia narrow.

2. Arctica. Leaves short often subcanaliculate, us. obtuse.

3. Affinia. Leaves long carinate us. acute.

cc. Capsule thick suboval not strangulate.

4. Rupestris. Capsule immersed or emergent, more or less sulcate; teeth erect or patent when dry, joined in pairs but us. subpartite; cilia narrow. Leaves long carinate.

5. Leiocarpa. Capsule wholly or partly immersed, not sulcate; cilia very broad; teeth not connate. Leaves sometimes short and nearly flat at borders.

c. Leaves faintly or not carinate, partly recurved or wholly flat at borders, us. long and crisped. Sometimes dioecious.

III. Lyellina. Capsule us. immersed; cilia somewhat broad. Leaves not or faintly crisped; alar cells not hyaline. Dioecious, often (in Europe) with propagula when sterile.

IV. Ulota. Capsule exserted; cilia narrow. Leaves more or less distinctly crisped; alar cells mostly pluriseriate and hyaline. Tufts us. pulvinate. Monoecious.

V. Pseud-Ulota. Capsule exserted; cilia narrow. Leaves strongly crisped; hyaline alar cells uniseriate or indistinct. Tufts pulvinate. Dioecious very r. fruiting, often with propagula when sterile.

B. Stomata of capsule immersed.

VI. Calyptoporus. Capsule often strangulate; cilia us. sub-filiform. Leaves more or less recurved, gen. not crisped. Monoecious.

a. Leaves partly flat at borders. Plants gen. small.

1. **Psilocarpa.** Capsule immersed thick neither sulcate nor strangulate. Leaves not crisped.

2. **Microcarpa.** Capsule immersed thick sulcate us. strangulate. Leaves not crisped.

3. **Pulchella.** Capsule narrow subcylindric sulcate not distinctly strangulate, us. exserted. Leaves more or less crisped.

b. Leaves recurved nearly all around, not crisped. Capsule sulcate.

aa. Leaves with hyaline hairpoint.

4. **Diaphana.** Capsule immersed not strangulate. Plants small.

bb. Leaves without hairpoint.

5. **Rivularia.** Capsule immersed. Leaves channelled short broadly obtuse; cells large thin-walled, the upper polygonal; costa abbreviate. Plants gen. large, growing in or near water, r. fruiting.

6. **Cupulata.** Leaves carinate long gen. acuminate acute; upper cells small rotundate thick-walled; costa gen. percurrent. Capsule sometimes not strangulate; teeth not appressed to it. Plants often large, growing on rocks or less often on trees.

7. **Pumila.** Leaves more or less distinctly carinate often obtuse; upper cells small rotundate thick-walled; costa gen. percurrent. Capsule us. strangulate; teeth appressed to it when dry. Plants small us. pulvinate, growing on trees or less often on rocks.

I. Coelophyllum Kindb.

A. Capsule with nearly as long neck; teeth orange.

1. O. obtusifolium Schrader.

Leaves ovate-oblong obtusate not involute at apex, also the perichetial; costa pellucid not percurrent. — Trees and roofs. *Eur.* common. Sweden, Norway, Switzerl. *Amer.* not common. Can.: Macoun.

2. O. inflexum C. Mueller syn. — *O. brachytrichum* Schimper: Lesq. et Jam. ?

Leaves narrower than in the last and less obtusate or subacute subinvolute nearly all around; cells larger; costa shorter, sometimes ceasing far below apex. — Trees r. *Amer. Can.*: Macoun.

B. Capsule with short neck; teeth wanting.

3. *O. gymnostomum* Bruch.

Leaves subovate-oval obtusate obtuse involute all around; costa subpercurrent brown opaque. Perichetial leaves narrower sometimes acute. — Trees princ. *Populus tremula* r. *Eur.* Sweden not uncommon, Norway! *Amer. Can.*: Wagborne.

II. *Dorcadion* Adanson; Lindberg.

1. *Speciosa*.

A. Capsule short-emergent; pedicel very short; teeth free or slightly connate at base.

4. *O. Bolanderi* Sullivant icon. muscor.

Leaves ovate-lanceolate short-acuminate subacute, faintly recurved below, flat above, faintly papillose, appressed when dry, falcate when moistened. Capsule short-necked, smooth when young finally sulcate; teeth yellowish appressed when dry; calyptra hairy. Tufts about 3 c. m. high. — Rocks r. *Amer. »U. S.»*: Sullivant.

5. *O. psilothecium* C. M. et Kindb. l. c.

Differs from the last: Leaves shorter often obtuse or obtusate, recurved nearly all around, less papillose, not appressed when dry. Peristomial teeth not connate. Calyptra finally glabrous. Tufts 1—2 c. m. high. Capsule greenish as in *O. affine*. — Trees r. *Amer. Can.*: Macoun. U. S. Oregon: Roell.

B. Capsule exerted gen. long-emergent; teeth connate in pairs.

a. Capsule arrounded below, not defluent to the short neck.

6. *O. lævigatum* Zetterstedt. — *O. rhabdophorum* Venturi ?

Leaves broadly ovate-lanceolate short-acuminate not subulate. Capsule brown us. wholly smooth; pedicel longer. Tufts dark green or blackish not high. — Alp. rocks r. *Eur.* Norway: J. E. Zetterstedt; I. Hagen. — *Amer. Can. Pacif. distr.*: Macoun.

b. Capsule defluent to the long neck.

aa. Capsule not or very faintly sulcate when old.

7. *O. Kingii* Lesquereux; Sullivant icon. m.

Leaves as in the last but nearly appressed when dry. Capsule longer or shorter than pedicel; teeth whitish erect when dry; calyptra hairy. Tufts as in the last, 1—2 c. m. high. — Rocks r. *Amer. Can. Brit. Col.*: Macoun. U. S.: Henderson, com. Cardot.

bb. Capsule us. distinctly sulcate when old.

8. *O. speciosum* Esenbeck.

Leaves ovate-lanceolate subulate-acuminate or r. subobtusate at apex, not or r. appressed when dry, falcate when moistened. Capsule pale brown when ripe; teeth whitish or pale yellow, us. appressed to it when dry; cilia not sinuous; pedicel shorter than capsule; calyptra hairy. Tufts us. pale or yellowish green; stem us. long. — On trees or less often on stones. *Eur.* common, but r. in alp. regions. Sweden, Norway, Switzerl. *Amer.* Can.: Macoun; Waghorne.

*** *O. elegans* Schwægrichen.**

Capsule pale or greenish; teeth pale yellow; calyptra nearly glabrous. Tufts 1—2 c. m. high. — *Eur.* r. »Finl.»: Lindberg. *Amer.* »U. S.»: Cardot. (*Asia*, *Siberia*: H. W. Arnell).

9. *O. Roellii* Venturi.

Differs from *O. speciosum*: Capsule longer exserted shorter than pedicel; teeth pale yellow erect when dry. — Rocks r. *Amer.* U. S.: J. Roell.

*** *O. stenocarpum* Venturi. — *O. lonchothecium* C. M. et Kindb.**

Capsule less distinctly sulcate; teeth often smooth. Leaves dark green nearly appressed when dry. — Rocks r. *Amer.* Can.: Macoun. U. S.: Roell.

*** *O. Schlotthaueri* Venturi.**

Capsule longer than pedicel; teeth sometimes appressed when dry. — Rocks r. *Amer.* U. S.: Roell.

10. *O. Killiasii* C. Mueller.

Leaves ovate-lanceolate shorter and shorter-subulate than in *O. speciosum*, appressed when dry, not falcate when moist. Capsule faintly sulcate; teeth yellowish erect when dry; cilia sinuous; pedicel shorter than capsule; calyptra finally glabrous. Tufts brown 1—3 c. m. high. — Alp. rocks r. *Eur.* Norway, Switzerl. *Amer.* U. S.: Roell.

2. *Arctica*.

11. *O. Pylaisii* Bridel; C. M. syn. — *O. Breutelii* Hampe; *O. Blyttii* Schimper.

Leaves ovate-oblong or broadly ovate-lanceolate more or less obtuse, narrowly or slightly reflexed, faintly open when moistened; cells gen. short. Capsule suboval; teeth not or faintly perforate; cilia short or rudimentary; calyptra hairy.

Leaves short us. faintly papillose; costa subpercurrent. Capsule exserted distinctly sulcate; teeth opaque; pedicel long. Tufts olive-green or brown. — Rocks near sea in northern princ.

arctic distr. r. *Eur.* Norway: E. Nyman; I. Hagen. Spetsbergen: Berggren. *Amer.* Greenl.: Berggren. *Can.*: Waghorne.

* **O. brevinerve** Lindberg.

»Leaves nearly smooth; costa abbreviate. Tufts brown. — *Eur.* r. Finl.: Lindb. musci scandin.

* **O. Sommerfeltii** Schimper.

Leaves longer nearly smooth; costa subpercurrent. Tufts green or yellowish green. — *Eur.* r. Norway: W. Baur; Arnell.

* **O. microblephare** Schimper.

»Leaves broadly ovate-lanceolate distinctly papillose; costa subpercurrent. Capsule faintly sulcate; teeth smooth above; pedicel short. Tufts blackish. — *Eur.* r. Finl.: Lindb. l. c.

* **O. arcticum** Schimper.

Leaves as in the last. Capsule faintly sulcate not wholly exserted; teeth opaque; pedicel short. Tufts blackish or dark green. — *Eur.* r. Norway: Zetterstedt; W. Baur. Russia: Brotherus.

* **O. groenlandicum** Berggren.

»Differs in peristomial teeth separated not connate in pairs. *Amer.* r. Greenl.: Berggren.

12. **O. sordidum** Sullivant et Lesquereux; Sull. icon. m.

Leaves ovate-oblong or broadly ovate-lanceolate gen. acute sometimes short-acuminate, faintly papillose and broadly recurved, open when moistened; inner basal cells narrow. Capsule broad-oval or subpiriform immersed or nearly exserted; teeth opaque perforate above; cilia long; calyptra sparingly hairy; pedicel very short. Tufts dusky green about 1 c. m. high. — Trees r. *Amer.* *Can.*: Macoun.

3. Affinia.

13. **O. affine** Schrader.

Leaves ovate-lanceolate us. subulate-acuminate and very papillose. Capsule oblong yellowish green defluent to the long neck; teeth pale perforate (fenestrate) above, finally appressed; pedicel very short; calyptra sparingly hairy. Tufts green us. 2—3 c. m. high. — On trees r. on stones. *Eur.* common. Sweden, Switzerl. *Amer.* r. *Can.*: Macoun.

* **O. fastigiatum** Bruch. — *O. neglectum* and *O. appendiculatum* Schimp.

Leaves shorter-acuminate less papillose. Capsule suboval; calyptra nearly glabrous. Tufts us. pulvinate and about 1 c. m. high. Habit of *O. pumilum*. — Trees. *Eur.* not uncommon. Sweden, Switzerl. Germany: Warnstorf.

* **O. acuminatum** Philibert.

Capsule more abruptly narrowed below, sometimes suboval; teeth rudimentary. — Trees r. *Eur.* France: Philibert. Italy: Venturi.

* **O. præmorsum** Venturi.

Leaves less papillose. Capsule oval; teeth often rudimentary, deflexed when evolute; calyptra hairy. Stem 2—3 c. m. high. Rocks r. *Amer.* U. S.: Roell.

4. **Rupestria.**

14. **O. rupestre** Schleicher.

Leaves ovate-lanceolate often rigid, us. faintly papillose and not subulate-acuminate. Capsule brown gradually narrowed below, us. immersed; pedicel us. shorter; teeth yellowish. Tufts us. brown or blackish and not high. — Us. growing on rocks. *Eur.* common. Sweden, Norway, Switzerl.! Austria: Venturi. *Amer.* Can.: Macoun.

* **O. Franzonii** Notaris.

Tufts green. Leaves less rigid. — On trees and rocks r. *Eur.* Switzerl.!

* **O. Sturmii** Hornschuch.

Leaves longer acuminate subcanaliculate. Capsule arrounded below; teeth paler. Tufts us. blackish. — Rocks not common. *Eur.* Sweden, Norway, Switzerl.! France: Husnot. *Amer.* Can.: Macoun.

15. **O. texanum** Sullivant icon. muscor.

Differs from *O. rupestre* **Sturmii*: Leaves distinctly carinate and less rigid, sometimes nearly subulate; basal cells orange. Peristomial teeth dark yellow or orange. Tufts us. brown-green. Stem often very long. — Rocks r. *Amer.* Can. Pacif. distr.: Macoun.

16. **O. Douglasii** Duby; Lesq. et Jam.

Leaves ovate lanceolate long-acuminate subsubulate very papillose not rigid. Capsule pale brown nearly exserted, arrounded below, nearly smooth when young; teeth erect whitish or pale; pedicel somewhat long. Tufts yellowish green; stem often long. — Alp. rocks r. *Amer.* Pacif. distr. Can. Brit. Col.: Macoun. U. S.: Roell.

5. **Leiocarpa.**

17. **O. leiocarpum** Br. eur. — *O. striatum* (Hedw.) Bridel.

Leaves ovate-lanceolate subulate-acuminate carinate us. long. Capsule brown-yellow suboval or oval-oblong quite smooth; neck not distinct; teeth opaque finally appressed, orange in

younger state; cilia yellowish narrower; calyptra not densely hairy. Tufts green or yellowish green 2—4 c. m. high. — On trees r. on rocks. *Eur.* not r. Sweden, Norway, Switzerland. *Amer.* r. Can.: Drummond 154.

* **O. Shawii** Wilson.

Capsule yellowish; teeth pale; cilia unknown. Leaves with shorter costa. Tufts dark green 1—2 c. m. high. — On trees r. *Eur.* Switzerland. France: Philibert.

18. O. exiguum Sullivant icon. muscor.

Leaves small short gen. ovate-oblong, sometimes broadly ovate-lanceolate or sublinear, obtusate or short-acuminate gen. obtuse, often nearly wholly flat or slightly reflexed at borders; cells gen. short; costa subpercurrent or shorter. Capsule oval faintly striate when old; neck none or indistinct; cilia whitish broader than teeth; calyptra nearly glabrous; stomata? Tufts small green about 0.4 c. m. high. Dioecious. — Base of trees r. *Amer.* U. S. Nat. Park: Roell.

III. *Lyellina* Kindb.

A. Capsule immersed; pedicel indistinct. Leaves nearly appressed when dry not flexuous, with numerous propagula.

19. O. Lyellii Hooker et Taylor.

Leaves narrowly ovate-lanceolate subulate-acuminate nearly flat at borders. Capsule suboblong pale brown; cilia reddish; calyptra sparingly hairy. Tufts dark green not high. Often sterile. — On trees. *Eur.* not r. below alp. regions. Sweden, Germany, Switzerland. Greece: Orphanides. (*Amer.*: U. S.: Lesq. et Jam.)

B. Capsule more or less emergent; pedicel distinct. Leaves without propagula, the upper us. flexuous or crisped.

20. O. papillosum Hampe. — O. Pringlei C. M.

Leaves as in the last but longer and recurved at least at one side to the greater part, more papillose also below. Capsule longer, subcylindric brown and partly emergent. Stem us. higher. Tufts us. yellowish or bright green. — Trees and rocks. *Amer.* not r. Can.: Macoun. U. S. Calif.: Mrs L. C. Feely.

* **O. strictum** Venturi.

Leaves dark green shorter, appressed when dry. — *Amer.* r. Can.: Macoun.

21. O. lyelliioides Kindb. revue bryol. 1896.

Leaves long as in *O. papillosum*, nearly flat or undulate at borders, faintly papillose, not appressed when dry; the upper crisped. Capsule narrow-cylindric pale brown nearly wholly

exserted; pedicel somewhat long. Tufts dark green, blackish below, somewhat high. — Trees and rocks r. *Amer.* Can. Vanc. Isl.: Macoun.

IV. *Ulot* Mohr.

A. Leaves not or indistinctly crisped; hyaline alar cells gen. uniseriate or indistinct.

a. Leaves longish not twisted; nearly all cells short.

22. *O. americanum* Beauvois. — *Ulot* *Hutchinsiae* (Smith) Hammar.

Leaves more or less recurved princ. at base, broadly ovate-lanceolate gen. subobtusate at apex. Capsule thick piriform; calyptra densely hairy. Tufts green or blackish. — On rocks or r. on trees. *Eur.* common. Sweden, Norway, Switzerland. *Amer.* Can.: Macoun; Waghorne.

23. *O. subulatum* C. M. et Kindb. — *Ulot* C. M. et K. l. c.

Leaves not recurved, ovate-lanceolate subulate-filiform at apex, nearly appressed when dry. Capsule small narrow-clavate. Tufts dark green or blackish. — Trees r. *Amer.* Can. Brit. Col.: Macoun.

b. Leaves short faintly twisted when dry; basal cells long.

24. *O. Barclayi* Mitten. — *Ulot* Mitt.; Sulliv. icon. m.; *Orthotrichum* Kindb.

Leaves gen. ovate-oblong subacute, not or faintly recurved below, flat to the greater part. Capsule subobovate thicker than in *O. americanum*; calyptra sparingly hairy. Tufts brown-green. — In alp. princ. arctic districts r. *Amer.* Alaska: J. M. Macoun. U. S.: Roell.

B. Leaves long very crisped; hyaline alar cells gen. indistinct.

25. *O. megalosporum* Venturi. — *Ulot* Vent.; *Orthotrichum* Kindb.; *Ulot* *subulifolia* C. M. et Kindb. l. c.

Leaves recurved at base, subulate-piliform at apex; upper cells rotundate, the basal long. Capsule small short-obovate sulcate finally subcylindric; pedicel long thin; calyptra nearly glabrous. Stem often creeping. — Trees r. *Amer.* Pacif. distr. Can.: Macoun. U. S.: Roell.

C. Leaves more or less crisped; hyaline alar cells in several rows.

a. Capsule gen. not wholly exserted; pedicel short. Leaves long distinctly papillose nearly opaque; nearly all cells short.

26. *O. connectens* Kindb. in *Ottawa Natur.* IV, 64. — *Ulot* *camptopoda* Kindb. cat. Canad. m.

Leaves recurved below, often subulate at apex, very crisped; alar cells in straight transverse rows. Capsule small obovate not constricted; pedicel often curved or geniculate in younger state. — Trees r. *Amer. Can.*: Macoun.

b. Capsule long-exserted; pedicel long. Inner basal leaf-cells long

aa. Leaves not long with long cylindric papillæ, faintly crisped; alar cells short-rectangular. Calyptra densely hairy.

27. *O. curvifolium* Wahlenberg. — *Uloa* Bridel.

Leaves obtusate acute or subobtuse, nearly flat at least at base, not or slightly crisped when dry, open-erect straight when moist. Capsule obovate sulcate in its whole length, finally subcylindric; neck short; teeth finally deflexed. Tufts blackish below. — Rocks princ. in northern districts gen. r. *Eur.* Sweden and Norway, less r. in alps! *Amer. Can.*: Macoun; Waghorne.

28. *O. scabridum* Kindb. — *Uloa* Kindb. cat. *Canad. m.*; *U. americana* Mitten ?

Leaves obtusate or broadly acuminate subobtuse, recurved below to middle, distinctly crisped when dry, falcate when moist. Capsule obovate or suboblong sulcate in upper half when young, finally subcylindric; neck somewhat long; teeth erect. Tufts green or brown, dark brown below. — Rocks r. *Amer. Can.* Rocky mts: Macoun.

bb. Leaves long with short papillæ, nearly smooth at least at borders, us. not strongly crisped (at least the elder); alar cells subquadrate. Calyptra densely hairy. Stem us. decumbent. Peristome not appressed; cilia very short, us. wanting.

29. *O. Ludwigii* Bridel. — *O. coarctatum* Beauvois.

Capsule thick piriform with short stripes near the small mouth; teeth erect. — On trees gen. r. *Eur.* Sweden, Norway! France: Husnot. *Amer. Can.*: Macoun; Waghorne; Drummond 146.

30. *O. Drummondii* Hooker et Greville. — *Uloa* Bridel.

Capsule narrowly piriform attenuate to mouth, striped to neck; teeth patent when dry. — Trees in northern distr. r. *Eur.* Sweden, Norway! Scotl.: Hunt, com. Husnot. *Amer. Can.*: Waghorne.

cc. Leaves long with short papillæ, not recurved at base, strongly crisped. Peristome with long cilia. Stem erect. Capsule us. finally subcylindric.

31. *O. calvescens* Wilson. — *Uloa* Wils.; *Orthotrichum* Kindb.

Leaves us. subulate at apex; upper cells rotundate, the outer

basal long-rectangular (often to middle of leaf) in straight rows. Capsule not deeply sulcate, not strangulate; pedicel thin very long; calyptra sparingly hairy. — Trees r. *Eur.* Irel.: Stewart and Holt.

32. *O. Bruchii* Hornschuch. — *Ulota* Hsch.; *Orthotrichum* Wilson.

Leaves us. subulate at apex; upper cells rotundate, the outer basal short-rectangular in straight rows. Capsule deeply sulcate; calyptra densely hairy. — On trees or very r. on stones. *Eur.* not uncommon. Sweden, Switzerl. France; Husnot. *Amer.* r. Can.: Macoun.

33. *O. obtusiusculum* C. M. et Kindb. — *Ulota* C. M. et K. l. c.

Differs from the last: Leaves more or less obtuse at apex; upper and middle cells oval-oblong. Capsule narrower; pedicel longer and thinner. — Trees r. *Amer.* Can. Brit. Col. and Vanc. isl.: Macoun.

34. *O. ulophyllum* Ehrhart. — *Bryum striatum* var. *ulophyllum* Ehrh. 1780; *Weisia ulophylla* Ehrh. 1787; *Orthotrichum* Kindb.; *O. crispum* Hedwig 1788; *Ulota* Brid. 1819.

Differs from *O. Bruchii*: Outer leaf-cells rhombic-quadrate in oblique rows. Capsule shorter, us. strangulate. — On trees. *Eur.* not uncommon. France! Sweden: Zetterstedt. *Amer.* r. Can.: Macoun; Waghorne.

* ***O. crispulum*** Bruch. — *Ulota* Bruch; *Orthotrichum* Br. eur.

Capsule not strangulate, oval or round-oval not defluent to neck. — *Eur.* not uncommon. Sweden, Norway, France! *Amer.* Can. not r.: Macoun; Waghorne.

* ***O. intermedium*** Schimper. — *Ulota* Sch.; *Orthotrichum* Kindb.

Capsule not or faintly constricted, finally subcylindric, suboval-oblong when young. — Sometimes on rocks, gen. r. *Eur.* Norway! Sweden: P. Olsson. Austria: Breidler. *Amer.* Can.: Macoun; Waghorne. Miquelon isl.: Delamare, com. Cardot.

35. *O. Rehmanni* Juratzka. — *Ulota* Jur.; *Orthotrichum* Kindb.

Differs from *O. ulophyllum* **crispulum*: Leaves less crisped; alar cells quadrate. Calyptra nearly glabrous. — Trees r. Austria: Breidler, com. C. Mueller.

V. Pseud-*Ulota* Kindb.

36. *O. jutlandicum* Bridel. — *Ulota phyllantha* Brid. in part.

Leaves sublinear above middle, short-acuminate often sub-obtuse, nearly flat at borders, faintly papillose; nearly all basal cells long; costa smooth. Capsule oblong; neck long; teeth erect; pedicel long straight thin. — On trees princ. near sea

gen. r. *Eur.* Germany: C. Mueller. Norway: J. Roell. France: Husnot. *Amer.* Can. fruiting: Macoun; Waghorne.

87. *O. maritimum* C. M. et Kindb. — *Ulot* cat. Can. m.; *U. phyllantha* Bridel in part.

Differs from the last: Leaves gradually attenuate to the subulate apex, more distinctly papillose also on costa. Capsule broad-oval; neck short; pedicel shorter and thicker, curved when moistened. — Rocks near sea less r. *Eur.* Sweden not uncommon! Norway: E. Nyman. *Amer.* Can. fruiting: J. Macoun. Alaska: J. M. Macoun.

VI. *Calyptoporus* Lindberg.

1. *Psilocarpa*.

38. *O. psilocarpum* James. — Sullivant icon. musc.

Leaves broadly ovate-lanceolate obtusate subobtusely faintly papillose, recurved below, sometimes faintly crenulate at apex; cells small, the basal short. Capsule broad-oval finally sub-oblong; neck not distinct; lid mamillate; teeth free opaque erect; cilia narrow; calyptra glabrous. Stem about 0.5 c. m. long. — Trees r. *Amer.* U. S.: James, com. C. Mueller. Can.: Macoun.

2. *Microcarpa*.

39. *O. microcarpum* Notaris; Husnot muscol. gall.

Leaves flat at borders at least at one side, nearly smooth, gen. obtuse suboblong or broadly ovate-lanceolate; basal cells short. Capsule suboval; neck not distinct; teeth papillose yellowish connate in pairs, appressed when dry; calyptra glabrous. — On small trees princ. *Morus* r. *Eur.* Switzerl. near Lugano!

40. *O. Hallii* Sullivant et Lesquereux; Sull. icon. m.

Leaves recurved below middle, distinctly papillose, ovate-lanceolate acute or subsubulate at apex; alar cells quadrate, the inner basal short-rectangular. Capsule oval; neck not distinct; teeth smooth whitish connate in pairs, erect when dry; calyptra hairy. — Trees r. *Amer.* Can.: Macoun.

41. *O. Jamesii* Sullivant icon. muscor.

Leaves faintly reflexed, very papillose with long cylindric papillæ, broadly obtuse ovate-oblong; marginal cells quadrate, the inner basal somewhat long-rectangular not hyaline. Capsule obovate-piriform often with thick neck; teeth smooth pale, wholly or nearly free, deflexed-appressed when dry; calyptra sparingly hairy. — Limestone rocks r. *Amer.* Can.: Macoun.

3. *Pulchella*.

42. *O. pulchellum* Brunton.

Leaves long narrow subulate at apex, recurved below, flat

above, very papillose with long papillæ, us. slightly crisped; nearly all basal cells long. Capsule striped oblong finally cylindrical; teeth us. orange. Tufts yellowish green. — On trees in warmer districts or r. on stones. *Eur.* r. Sweden: Wahlstedt. Denmark: M. F. Lange. France: Husnot. *Amer.* Can. not r. in Pacif. distr.: Macoun.

***O. ulotæforme** Renauld et Cardot.

Leaves distinctly crisped. Peristome pale. — *Amer.* Can.: Macoun. U. S.: Henderson, com. Cardot.

43. O. Winteri Schimper; Limpricht.

Leaves short-acuminate acute, recurved nearly all around, faintly papillose with short papillæ, scarcely twisted, gen. shorter than in the last; outer basal cells short. Capsule faintly striate oblong-cylindric; teeth pale. Tufts green, brown below. — Trees and rocks r. *Eur.* Germany: Winter, com. C. Mueller. *Amer.* Can. Pacif. distr.: Macoun.

4. Diaphana.

44. O. diaphanum Gmelin. — *Bryum* Gm.; *Orthotrichum* Schrader.

Leaves broadly ovate-lanceolate nearly smooth. Capsule oblong smooth when young; neck short; calyptra nearly glabrous. Stem 1 c. m. or shorter. — On trees or r. on stones. *Eur.* not r. Sweden, Germany! *Amer.* r. »U. S.: Lesq. et Jam.

***O. canum** Mitten.

»Capsule emergent. Leaves with shorter hairpoint. — *Amer.* r. Can.: Drummond; Lesq. et Jam.

5. Rivularia.

45. O. rivulare Turner.

Leaves decurrent nearly smooth; alar cells rectangular very large. Capsule oval short-necked; teeth opaque. Tufts blackish. Stem often long. — Stones and trees in running water r. *Eur.* Engl.: Rogers. France: Le Jolis; Husnot. *Amer.* U. S.: Henderson, com. Cardot.

46. O. euryphyllum Venturi.

Differs from the last: Leaves not distinctly decurrent; alar cells short-rectangular or indistinct. Capsule broad-oval; teeth less papillose. Stem about 2—3 c. m. — Stones in running water r. *Amer.* U. S.: Roell.

47. O. Sprucei Montagne.

Differs from *O. rivulare*: Leaves more papillose, not distinctly decurrent; cells larger, the alar quadrate. Capsule smaller. Tufts low dark green. — Base of trees near water r. *Eur.* France: Philibert.

6. Cupulata.

A. Capsule not distinctly strangulate; teeth smooth erect when dry.

a. Capsule narrow gen. long-exserted.

48.O.anomalum Hedwig.

Leaves subcanaliculate and not subulate at apex, hyaline below, faintly papillose above. Capsule oblong or oblong-cylindric with brown stripes; teeth nearly free. — On stones, less often on trees and roofs. — *Eur.* common. Sweden, Norway, Switzerl.! *Amer.* r. Can.: Macoun.

b. Capsule thick suboval, sometimes immersed.

49.O.consimile Mitten; Sulliv. icon. musc.

Leaves not subulate at apex, faintly papillose above, hyaline below. Capsule us. long-exserted; teeth nearly free. Stem us. about 0,5 c. m. — Rocks r. *Amer.* Can. Pacif. distr.: Macoun.

* **O.anomaloides** Kindb. n. subsp.

Capsule less exserted; cilia shorter than teeth. Stem higher. — *Amer.* r. Can.: Macoun.

50.O.Watsoni James; Sulliv. icon. musc.

Leaves subulate at apex, strongly papillose with long cylindric papillæ. Capsule wholly immersed; teeth connate in pairs. Stem 1—2 c. m. high. — Alp. rocks r. *Amer.* »U. S.«: Lesq. et Jam.

B. Capsule thick us. strangulate, more or less immersed; teeth nearly free often papillose, often patent when dry. Leaves carinate.

a. Peristomial teeth entire.

51.O.urnigerum Myrin. — »O. perforatum Limpricht«: Venturi.

Leaves very papillose, not hyaline below. Capsule us. with indistinct neck; teeth papillose below, gen. erect when dry. Tufts loose dark green. — Rocks princ. siliceous r. *Eur.* Switzerl.! Sweden less r.l; M. Huss. France: Puget.

52.O.cupulatum Hoffmann.

Leaves us. faintly papillose, often hyaline below. Capsule with more or less distinct us. thick short neck; teeth gen. smooth, often patent when dry. Tufts us. dense and brown or blackish when dry. — Rocks. *Eur.* not uncommon. Sweden, Switzerl.! *Amer.* Can.: Macoun.

* **O.nudum** Dickson; Venturi.

Capsule subemergent with long not defluent neck. — *Eur.* not uncommon. Switzerl.! Austria: Breidler. Engl.: Rogers. France: Brébisson. *Amer.* Can.: Macoun.

* **O. Sardagnæ** Venturi.

Capsule with long defluent neck. — Dolomitic rocks r. *Eur.* Switzerl. Austria: Venturi.

* **O. Venturii** Notaris.

Capsule with short subdefluent neck. — Rocks r. *Eur.* »Austria»: Venturi.

b. Peristomial teeth gen. partite and papillose.

53. **O. Lescurii** Austin; Sulliv. ic. m.; Kindb. rev. bryol. 1896.

Leaves nearly smooth short obtusate subobtuse. Capsule immersed with short very thick not defluent neck; teeth erect; calyptra nearly glabrous. Tufts low. — Limestone rocks r. *Amer.* Can. Brit. Col.: Macoun.

* **O. Porteri** Austin.

»Capsule nearly exserted. *Amer.* r. U. S.: Lesq. et Jam.

54. **O. Baldaccii** Venturi et Bottini.

Leaves very papillose somewhat long and acuminate. Capsule immersed with short defluent neck; teeth patent; calyptra sparingly hairy. Tufts about 2 c. m. high. — Alp. calcareous rocks r. *Eur.* Spain: Dieck, com. Roell. »Montenegro»: Bottini.

7. *Pumila*.

A. Capsule arrouded below when operculate, finally strangulate when dry. Calyptra campanulate.

55. **O. Schimper** Hammar. — *O. fallax* Schimper.

Leaves broadly ovate-lanceolate, gen. broadly obtuse and subcanaliculate; basal cells short-rectangular. Capsule suboval not or slightly emergent; stomata nearly superficial; calyptra glabrous. — On trees and roofs. *Eur.* not uncommon. Sweden! Austria: Venturi. *Amer.* r. Can.: Macoun.

56. **O. strangulatum** Beauvois; Sulliv. icon. musc.

Differs from the last: Leaves often subulate at apex; basal cells sometimes longer. Capsule finally exserted; calyptra sparingly hairy. — On trees or r. on rocks, r. *Amer.* Can.: Macoun.

B. Capsule not arrouded below when operculate.

a. Capsule not distinctly constricted when dry. Leaves subcanaliculate.

57. **O. pallens** Bruch.

Leaves not r. obtuse at apex, faintly papillose, more or less long, often decurrent; inner basal cells somewhat long. Capsule partly emergent somewhat thick with long defluent neck, us. pale yellow; stomata us. not much immersed; teeth us. orange; calyptra campanulate yellowish us. glabrous. Stem us. about 1 c. m. high. — On trees princ. in warmer districts.

Eur. not r. France, Switzerl.! Sweden: Grœnwall. *Amer.* r. »Can.»: Mitten.

* **O.scopulorum** Lindberg. — *O. Arnellii* and *O. rufescens* Grœnwall; Limpricht.

Leaves obtuse at apex. Calyptra sometimes papillose. — Rocks r. *Eur.* Finl.: S. O. Lindberg. Sweden: Arnell.

* **O.Rogeri** Bridel.

Leaves gen. obtuse. Capsule red brown; teeth reddish; stomata more immersed. — Trees r. *Eur.* Austria: Arnold in Rabenhorst bryotheca n. 1239. Norway: Kaurin. *Amer.* »U. S.»: Cardot.

58. **O.ohioëns**e Sullivant et Lesquereux. — Sulliv. icon. m.

Differs from *O. pallens*: Leaves decurrent, nearly smooth; inner basal cells short-rectangular, the outer subquadrate, the alar larger and rectangular. Capsule thick often immersed; neck short; teeth pale; calyptra sparingly hairy. — On trees. *Amer.* U. S.: Austin, com. C. Mueller. Can.: Macoun.

59. **O.lencomitrium** Bryol. eur.

Leaves broadly acuminate, gen. acute or subsubulate at apex, faintly papillose; inner basal cells somewhat long. Capsule greenish nearly or wholly exserted with long defluent neck, narrower than in *O. pallens*; stomata much immersed; teeth whitish sometimes not connate; calyptra narrowly conic whitish nearly glabrous. Stem 0,5—1 c. m. high. — Trees (princ. *Salix alba*) in southern districts r. Switzerl.!; Philibert. Austria: Venturi. France: Puget.

b. Capsule finally stragulate.

aa. Capsule narrow oblong-cylindric, often exserted; neck long; calyptra narrowly conic.

60. **O.tenellum** Bruch.

Leaves long carinate very papillose; inner basal cells somewhat long. Capsule with defluent neck; teeth pale connate in pairs; calyptra yellow sparingly hairy. Stem 1—2 c. m. high. — On trees princ. in lower districts. *Eur.* not common. Switzerl.! Sweden!; Grœnwall. Italy: Venturi. Germany: Herpell. *Amer.* r. Can.: Macoun.

bb. Capsule thick oval-oblong, us. immersed; neck short; calyptra broad.

61. **O.stramineum** Hornschuch.

Leaves us. long acute often carinate; inner basal cells long-rectangular. Capsule piriform more or less emergent; teeth orange papillose; calyptra straw-colored us. with few short hairs.

Tufts 2—3 c. m. high. — On trees or r. on stones. *Eur.* common below alp. regions. Sweden, France, Switzerl.! Germany: Warnstorf.

62. *O. alpestre* Hornschuch.

Differs from the last: Leaves shorter, less acute and more papillose. Peristomial teeth smooth above. Calyptra us. glabrous. Stem more radiculose. — On rocks in alp. regions, r. on trees. *Eur.* not r. Norway, Switzerl.! France: Husnot. *Amer.* r. »Can. and U. S.»: Lesq. et Jam.

63. *O. pumilum* Swartz.

Leaves broadly ovate-lanceolate carinate us. acute; basal cells short. Capsule suboblong immersed; teeth dark yellow; calyptra glabrous pale yellow. Tufts about 1 c. m. high. — On trees and roofs. *Eur.* not uncommon, Sweden, Switzerl.! France: Husnot. »*Amer.*»: Venturi.

64. *O. Brämii* Bryol. eur.

Differs from the last: Leaves longer. Capsule thicker, oval-piriform; teeth paler. — On trees or r. on stones. *Eur.* r. France: Berthoumieu. Norway: Bryhn.

65. *O. cylindrocarpum* Lesquereux; Sullivant icon. m.

Leaves broadly ovate-lanceolate obtusate subobtusate subcanaliculate; basal cells short. Capsule oval-oblong finally cylindric wholly exserted; calyptra hairy. Tufts 1 c. m. or lower. — Rocks and trees r. *Amer.* Can.: Macoun.

126. *Macromitrium* Bridel.

A. Leaves closely imbricate when dry. Calyptra with long hairs.

1. *M. Sullivantii* C. Mueller. — »M. Dregei» Sulliv. icon. m.

Leaves broadly ovate-lanceolate broadly acuminate subacute carinate scarcely reflexed, slightly papillose, entire, patent-erect when moist; cells round-oval; costa not percurrent. Perichetial leaves longer and narrower. Capsule oblong-cylindric, contracted at mouth, plicate at it and below when dry; exostome wanting or imperfect; endostomial tube very low; lid rostrate-subulate; pedicel somewhat long; calyptra covering capsule. Branches reddish brown not crowded. Monoecious. — On pine trees r. *Amer.* »U. S.»: Sulliv.

2. *M. Fitzgeraldi* Lesquereux et James.

»Differs from the last in its dark brown color; branches yellowish; capsule larger, distinctly ribbed; lid shorter, conic and blunt; pedicel shorter; leaves longer; male flowers not found. — On trees r. *Amer.* U. S.»: Lesq. et Jam.

B. Leaves crisped when dry. Calyptra slightly hairy.

3. *M. rhabdocarpum* Mitten.

»Leaves linear-lanceolate acute or subobtusate and subapiculate, carinate, not recurved, crenulate, papillose above, spreading-open and slightly flexuous when moist; upper cells round, basal oblong; costa yellowish percurrent. Perichetial leaves narrower, more acute. Capsule oval gradually narrowed to pedicel and to mouth, distinctly plicate; peristome simple; teeth short pale fragile; lid subulate; calyptra covering capsule. Branches not crowded. — *Amer. U. S., Florida*: Lesq. et Jam.

127. *Schlotheimia* Bridel.

1. *S. mucronifolia* Hooker et Greville. — *Macromitrium* H. G.; *Schlotheimia* Kindb.

Leaves sublinear or oblong-lingulate, obtuse often subtruncate, carinate, sometimes recurved, broadly limbate at one side below, entire indistinctly papillose not rugose, patent and faintly curved when moist, slightly crisped when dry; cells very small round-oval, lower marginal narrowly linear; costa dark brown, depressed on upper side, very prominent at back, excurrent to a thick deflexed point. Perichetial leaves similar. Capsule suboblong, contracted at mouth, not sulcate; teeth wanting; lid rostrate; pedicel not long; calyptra glabrous or slightly rough above, lacinate, covering half capsule. Branches red-brown densely crowded. Monoecious. — Trunks of palms r. *Amer. U. S.*: Lesq. et Jam. (Cuba: Wright, herb. Sullivant, com. C. Mueller.)

2. *S. Sullivantii* C. Mueller; Sulliv. icon. musc.

Differs from the last: Leaves often rugose, neither recurved nor limbate; basal cells rhomboidal; costa short-excurrent or (in perichetial leaves) subpercurrent. Capsule oblong-cylindric; teeth deflexed when dry; segments ciliiform; calyptra lobulate, rough above, covering whole capsule. — Trees r. *Amer. U. S.*: com. Macoun and Cardot.

128. *Zygodon* Hooker et Taylor.

I. *Eu-Zygodon*. Leaves green papillose carinate not recurved; cell-walls thickened. Perichetial leaves not sheathing. Dioecious.

II. *Gymnocephalus*. Leaves nearly plane or somewhat concave, bluish when moistened; cells smooth with thin hyaline walls. Monoecious.

III. *Amphidium*. Leaves green papillose carinate often recurved at one side; cell-walls not thickened. Perichetial leaves sheathing. Capsule piriform, long-necked; peristome none.

I. Eu-Zygodon.

A. Leaves sublinear apiculate us. not falcate; cells not opaque. Tufts small low.

a. Costa of leaves not excurrent. Capsule suboval.

1. *Z. viridissimus* Dickson. — Bryum Dicks.; Zygodon R. Brown.

Leaves gen. complicate above, r. dentate near apex, patent or curved when moist, green when dry. Capsule with short neck; teeth none. Often with propagula. — Trees. *Eur.* not r. France: Le Jolis. *Amer.* r. Can. Vanc. isl.: Macoun; Drummond 27.

* *Z. rupestris* Lindb.

Leaves narrower with longer pellucid terminal cell (point), often falcate, us. brown when dry. — Rocks somewhat r. *Eur.* Sweden!

2. *Z. conoides* Dickson. — Bryum Dicks.; Zygodon Hooker et Taylor; *Z. Brebissoni* Br. eur.

Leaves entire not complicate above, suberect when moist; cells larger than in the last. Capsule with longer and narrower neck; peristome double. — Trees r. *Eur.* Engl.: Holt. France: Brébisson; Le Jolis; Camus. *Amer.* »U. S.»: Cardot.

b. Leaves with excurrent costa. Capsule round-oval; teeth none.

3. *Z. Stirtoni* Schimper; Braithwaite.

Leaves entire gen. not complicate above, suberect when moist. Often with propagula. — Rocks and stonewalls r. *Eur.* Engl.: Holt. Sweden: Berggren.

B. Leaves ovate-lanceolate dentate above, falcate when moist; upper cells small opaque; costa not excurrent. Tufts large; stem long.

4. *Z. gracilis* Wilson; Braithwaite.

Leaves broadly long-acuminate. Capsule cylindric with short neck; peristome double. Tufts dark green. Habit of *Barbula reflexa*. — Calcareous rocks r. *Eur.* Engl.: Rogers; Holt.

5. *Z. Sullivantii* C. Mueller; Sullivant ic. m.

Leaves subulate-acuminate. Capsules unknown. Tufts brown-yellow. — Rocks r. *Amer.* »U. S.»: Sullivant.

II. Gymnocephalus Schwægrichen.

6. *Z. Forsteri* Dickson. — Bryum Dicks.; Zygodon Wilson.

Leaves flaccid entire sublingulate acute or short-acuminate; upper cells roundish, the hyaline basal rectangular; costa us. subpercurrent. Capsule piriform or oblong-cylindric with long neck; peristome double. Tufts small. — On bark of

trees (*Fagus*) r. *Eur.* Italy: Levier. France: Guépin, com. Husnot.

* *Z. Sendtneri* Juratzka.

Leaves somewhat narrower; costa gen. excurrent. — On bark of *Ostrya* r. *Eur.* »Istria»: Sendtner.

III. *Amphidium* Limpricht (*Amphoridium* Schimp.; Lesq. et Jam.)

A. Leaves subulate-acuminate very long, often red-brown. Dioecious.

a. Capsule exserted; lid rostrate. Perichetial leaves with not excurrent costa. Other leaves recurved below at one side, entire or in upper part faintly sinuate. Stem gen. high.

7. *Z. Mougeotii* Bryol. eur.

Leaves flexuous not distinctly crisped; the perichetial not much broader, short-sheathing gradually long-subulate. — Rocks. *Eur.* not r. Sweden, Norway, Switzerl., Spain! *Amer.* Can.: Waghorne.

8. *Z. crispatus* Kindb. revue bryol. 1896.

Leaves crisped entire with longer acicular point than in the last; the perichetial broader, long-sheathing, abruptly narrowed to the subulate shorter point. — Rocks r. *Amer.* Pacif. distr. Can.: Macoun.

b. Capsule not exserted; lid obtuse or apiculate. Perichetial leaves with long-excurrent costa. Other leaves gen. distantly serrulate above. Stem low when fruiting, often high when sterile.

9. *Z. californicus* Hampe.

Leaves crisped more or less reflexed below at one side, with long acicular point, us. red-brown; the perichetial not broader, short-sheathing gradually long-subulate. — Rocks r. — *Amer.* Pacif. distr.: Macoun.

* *Z. caespitosus* Mitten. — *Didymodon* Mitt.; *Zygodon* Kindb.

Leaves not reflexed less acicular. Capsules unknown. — *Amer.* r. Can. Vanc. isl.: Macoun.

B. Leaves acute fuscous not long. Monoecious.

10. *Z. lapponicus* Hedwig. — *Gymnostomum* H.; *Zygodon* Br. eur.

Leaves crisped entire not or slightly reflexed, sublinear or nearly gradually attenuate; the perichetial very much broader, long-sheathing, abruptly narrowed to a short point; costa faint abbreviate. Capsule scarcely exserted; lid rostellate. Tufts dense gen. low. — Rocks princ. in alps. *Eur.* not uncommon.

Sweden, Norway, Switzerl.! Amer. Greenl.: Berggren. Can.: Macoun; Moser.

* **Z. decipiens** Kindb. n. subsp.

Perichetial leaves longer acuminate; costa long-excurrent. — Amer. r. Can. Pacif. distr.: Macoun.

129. **Anoetangium** Schwægrichen.

I. **Pleurozygodon**. Leaves small entire obtusate or short-acuminate.

II. **Molendoa**. Leaves large from short crenulate base tapering to a long subulate channelled acumen.

I. **Pleurozygodon** Lindberg.

1. **A. compactum** Schwægrichen.

Leaves broadly ovate-lanceolate acute or apiculate, us. spirally twisted about stem when dry; costa yellow subpercurrent. Capsule obovate or oval-oblong; pedicel yellow. Tufts us. brownish with green tops, sometimes bright green. Stem often abruptly foliate. Habit of *Zygodon lapponicus* and *Grimmia* (*Streptophyllum*). — Rocks princ. in alps. Eur. less r. Norway, Switzerl.! Sweden: P. Olsson. Amer. r. Alaska: J. M. Macoun. Greenl.: Eberlin, com. Roell.

* **A. brevifolium** (Juratzka as var.) Kindb. n. subsp. — *Molendoa tenuinervis* Limpricht?

Stem not abruptly foliate. Leaves crowded much smaller, half as long and broad, ovate-oblong subobtusate nearly all brown, faintly twisted; cells less dusky; costa brown. Tufts more compact, ferruginous when dry. — Alp. rocks r. Eur. Norway in Dovrefjeld!

2. **A. Peckii** Sullivant ic. m. — »*A. pellucidum* Wilson»: Braithwaite.

Differs from *A. compactum*: Leaves sublinear longer and narrower, longer subulate at apex. Plants larger. Capsules unknown. — Rocks r. Eur. »Scotl.: Wilson»: Braithwaite. Amer. »U. S.»: Sullivant.

3. **A. Schliephackei** Limpricht. — *Pleuroweisia* Limpr.

Leaves linear obtuse crowded erect when dry; costa yellow not percurrent. Capsule oval. Tufts green above, 1—2 c. m. high. — Calcareous rocks in alp. region r. Eur. »Switzerl.: Græf»: Limpricht.

II. *Molendoa* Lindberg.

4. **A. Hornschuchii** Funck.

Upper leaves green; basal cells narrow; costa sometimes excurrent. Capsule obovate with somewhat long neck; pedicel

long (as in other species), often emergent above tufts. Stem often high. — Wet calcareous alp. rocks r. *Eur.* Austria: Breidler.

* **A. Sendtneri** Bryol. eur.

Leaves brown more crisped; costa not excurrent. Pedicel not emergent above tufts. — *Eur.* r. Switzerl.: Schimper.

Fam. 28. **Meeseaceæ.**

130. **Paludella** Ehrhart.

1. **P. squarrosa** L. — Bryum L.; Paludella Bridel.

Leaves decurrent crowded; lamina serrulate ovate acute or short-acuminate; costa subpercurrent. Perichetial leaves long-acuminate. Capsule suboblong; lid mamillate; pedicel red very long. Male flowers discoid. Dioecious. Tufts high tomentose. — Very wet swamps. *Eur.* Sweden and Norway common! Spetsbergen: Malmgren. Austria: Venturi. *Amer.* r. Alaska: J. M. Macoun. Can.: J. Macoun.

131. **Meesea** Hedwig.

A. Leaves from dilated base tapering to a gradually attenuate acumen, decurrent, not reflexed; basal cells larger than the upper. Pedicel very long.

1. **M. triquetra** L. — Bryum L.; Meesea Aongstrœm; M. tristicha Br. eur.

Leaves tristichous denticulate nearly around or entire, spreading from nearly appressed base. Dioecious. Male flowers subdiscoid. — Deep swamps. *Eur.* Norway! Sweden: K. F. Dusen. France: Husnot. *Amer.* Can.: Macoun; Dearness.

2. **M. longiseta** Hedwig.

Leaves plurifarious less spreading, entire or near apex sparingly dentate. Synoecious. — Swamps gen. r. *Eur.* Sweden: Lindberg; R. Hartman; M. Huss. Norway: M. N. Blytt. *Amer.* Can.: Macoun.

B. Leaves sublinear more or less reflexed; nearly all cells equal in size. Pedicel often shortish.

3. **M. trichodes** L. — Bryum L.; Meesea Spruce; M. uliginosa Hedwig.

Leaves plurifarious entire not or scarcely decurrent, us. obtuse, suberect or open-erect when moist. Capsule shorter than in the last; teeth yellow. Inflorescence variable. — Swamps and wet rocks princ. in alps. *Eur.* common in alps. Norway, Switzerl.! *Amer.* Greenl.: Berggren; Vanhoeffen. Can.: Macoun; Waghorne.

4.M.Albertinii Bruch et Schimper.

Differs from the last: Leaves more distinctly decurrent us. acute. Peristomial teeth pale very short often confluent. Monoecious. — Swamps r. *Eur.* Sendtner, com. Le Jolis. *Amer.* Can.: Waghorne.

132. **Amblyodon** Palisot de Beauvois.

1.A.dealbatus Dickson. — *Bryum* Dicks.; *Amblyodon* Beauv.

Leaves narrowly oblong acuminate acute not reflexed; the uppermost serrate at the not long acumen, finally pale green or whitish; the lower finally reddish; costa not percurrent. Capsule thick suboval. Stem about 1 c. m. high. Male flowers discoid. Monoecious or polygamous. Resembling *Meesea trichodes* in capsule. — Wet and turfy soil princ. in alps. *Eur.* Sweden, Norway not r.! France: Husnot. *Amer.* Can.: Macoun.

133. **Plagiobryum** Lindberg.

1.P.Zierii Dickson. — *Bryum* Dicks.; *Plagiobryum* Lindb.; *Zieria julacea* Schimper.

Leaves broad-ovate short-acuminate not reflexed; costa not excurrent. Capsule shorter than neck; teeth not much lower than endostome. Tufts silverglossy finally reddish. Dioecious. — Alp. rocks. *Eur.* not r. Norway! Sweden: R. Hartman. *Amer.* r. Can. Rocky mts 2250 metr. a. sea: Macoun.

2.P.demisum Hoppe et Hornschuch. — *Meesea* Hop. et Hsch.; *Plagiobryum* Lindb.; *Zieria* Schimper.

Leaves subovate somewhat long-acuminate reflexed; costa excurrent. Capsule longer than neck, deflexed to the ground when unripe; teeth very much lower than endostome. Tufts less glossy. Dioecious. — Earth on rocks in higher alp. region r. *Eur.* Norway! Switzerl.: Schimper. Austria: Breidler. *Amer.* Can. Rocky mts: Drummond 250.

134. **Mielichhoferia** Hornschuch.

A. Leaves small ovate-lanceolate, less strongly appressed; upper cells narrow. Peristomial (exostomial) teeth wanting-

1.M.nitida Hornschuch.

Leaves gradually acuminate acute, serrulate above often to middle. Perichetial leaves costate larger. Capsule us. suberect when dry; segments not split; pedicel reddish more or less flexuous; spores about 0,02 m. m. Tufts about 1 c. m. high. Habit of *Bryum* (Webera) but with smaller leaves. — Schistose princ. metalliferous (esp. copper) rocks in alps, r. *Eur.* Norway! France: Husnot.

2. *M. macrocarpa* Hooker. — *Weisia* Hook.; *Mielichhoferia* Schimp.

Leaves entire short-acuminate acute or sometimes subobtuse; the perichetial smaller, the inner indistinctly costate. Capsule as in the last. Branches clavate. Tufts about 1 c. m. high. — Rocks r. *Amer.* Can. Rocky mts: Drummond 74, com. Macoun.

B. Leaves short very small strongly imbricate; upper cells dilated. Peristome sometimes double.

a. Uppermost leaves obtusate, acute or obtuse; costa us. not percurrent.

3. *M. compacta* Hoppe et Hornschuch. — *Weisia* Hop. et Hsch.; *Mielichhoferia* Kindb.; *M. elongata* Hornsch.; Limpr.

Leaves gen. ovate-oblong, faintly serrulate near apex. Capsule us. deflexed when dry; teeth rudimentary r. present; segments distantly trabeculate, sometimes split in middle; pedicel yellow arcuate at least when young; *res* somewhat larger than in *M. nitida*. Tufts us. low when fruiting, sometimes to 8—10 c. m. high. — Growing as *M. nitida* but more often on wet rocks, r. *Eur.* Norway! Austria: Schimper. France: Husnot.

4. *M. erecta* Lindberg. — *Pohlia* (Cacodon) Lindb. *revue bryol.* 1883; *Mielichhoferia* Kindb.; *Oreas* Kindb. Laubm. Schwed. u. Norw.; *Mielichhoferia defecta* Sanio.

Leaves as in the last. Capsule erect when dry; teeth densely trabeculate; segments rudimentary or wanting; pedicel reddish sometimes arcuate when moistened. Tufts very low. — Alp. rocks r. *Eur.* Norway Wangsfjeld in Opdal: Kaurin.

b. Leaves suddenly cuspidate; costa often percurrent.

5. *M. cuspidifera* Kindb. cat. Canad. m.

Leaves from broad-ovate base cuspidate, entire or near apex slightly crenulate. Capsules unknown. Tufts about 2 c. m. high. — Damp alp. rocks r. *Amer.* Can. Rocky mts 1500 metr. a. sea: Macoun.

135. ***Orthodontium*** Schwægrichen.

1. *O. gracile* Wilson. — *Bryum* Wils.; *Orthodontium* Schw.; *Stableria* Lindb.

Leaves long very narrow sublinear or gradually subulate, flexuous nearly entire not reflexed; lower cells wider than the upper; costa not excurrent. Capsule greenish narrow suboblong cernuous when dry; neck not much narrower or shorter; pedicel pale sometimes longer than stem; teeth pale; lid rostellate. Tufts greenish about 1 c. m. or lower. Monoecious or paroe-

cious. Habit of *Bryum* (Leptobryum). — On sandstone rocks or on old trees r. *Eur.* Engl.: Hunt. France: Camus. *Amer.* »Calif.»: Howe.

Fam. 29. **Cinclidiaceæ** Kindb., new fam.

136. **Cinclidium** Swartz.

A. Leaves pale-limbate not recurved. Capsules unknown.
1. **C. Hymenophyllum** Br. eur. — *Mnium* Br. eur.; *Cinclidium* Lindb.

Leaves spathulate-lingulate narrowly limbate long-decurrent bright green; upper cells round-hexagonal or round-oval, the basal rectangular; costa abbreviate. Tufts high very dense tomentose to shoots. — Alp. rocks in northern districts, (»also in Switzerl.): Pfeffer) r. *Eur.* Norway! Sweden: E. Nyman. *Amer.* Greenl.: Berggren.

B. Leaves reddish or finally blackish limbate, more or less recurved when dry.

a. Leaves concave not decurrent; costa not excurrent. Synoecious.

2. **C. stygium** Swartz.

Leaves broadly spathulate us. with short acute point, generally red; those of stem r. blackish; shoots r. green; costa generally percurrent. Capsule suboval. — Swamps princ. in northern alps. *Eur.* Sweden, Norway not r.! Finl.: Brotherus. *Amer.* Can.: Macoun; Waghorne.

C. latifolium Lindb., hitherto not found in our district, differs in convex shoot-leaves and dioecious inflorescence.

3. **C. subrotundum** Lindberg.

Leaves round-spathulate obtuse or with very short obtuse point; those of stem green finally blackish; shoots green; costa not percurrent. Capsule subglobose. — Swamps in northern alps r. *Eur.* Norway! *Amer.* Greenl.: Berggren. Can. Labrador: Macoun.

b. Shoot-leaves convex somewhat long-decurrent; costa excurrent. Synoecious.

4. **C. Macounii** Kindb. revue bryol. 1896.

Stem-leaves round-spathulate finally blackish; shoot-leaves pale red or greenish lingulate generally obtuse. Capsule suboval. — *Amer.* r. Can. Rocky mts: J. Macoun 1885.

c. Dioecious. Male flowers discoid. Leaves concave.

5. **C. arcticum** Br. eur. — *Mnium* Br. eur.; *Cinclidium* C. M.

Stem-leaves red broadly spathulate often with short acute

point; shoot-leaves sublingulate gen. obtuse with more or less distinct point, us. pale red, sometimes decurrent; costa gen. percurrent, not excurrent. Capsule suboval; pedicel us. shorter than in other species. — Swamps in northern alps r. *Eur.* Norway in Dovrefjeld!

* *C. virescens* Kindb. n. subsp.

Leaves larger, only those of stem red. Shoots green very long; their leaves gen. not decurrent. Pedicel us. as long as in *C. stygium*. — Swamps in northern alps r. *Eur.* Norway in Dovrefjeld!

* *C. polare* Kindb. n. subsp.

Leaves much smaller, all deep-red; uppermost shoot-leaves acute sometimes short-acuminate. Capsules not seen. — Swamps in arctic district r. *Eur.* Spetsbergen: Berggren, com. A. G. Nathorst.

Fam. 30. **Bartramiaceæ.**

137. **Brentelia** Schimper.

1. **B. arcuata** Dickson. — *Mnium* Dicks.; *Breutelia* Sch.

Leaves from short base abruptly tapering to a long gradually attenuate striate (princ. when dry) serrate-denticulate acumen, papillose at back, spreading also when dry; costa sometimes excurrent. Capsule subglobose; pedicel us. arcuate, not much longer; segments long. Stem branching erect or decumbent, 8—15 c. m. long with rusty red rhizoids. R. fruiting. — Wet rocks princ. near sea and larger lakes, r. *Eur.* Norway: R. Hartman; E. Nyman. France: Renault. Engl.: Manchester Cryptog. Society.

138. **Bartramia** Hedwig.

I. **Eu-Bartramia**. Leaves mamillöse, not or only in lower half recurved.

1. **Ithyphyllæ**. Leaves channelled not crisped, not or near base (slightly) reflexed; cells linear.

2. **Crispæ**. Leaves carinate curling or crisped, recurved in lower half; upper cells subquadrate or short-rectangular.

II. **Plagiopus**. Leaves smooth, recurved all around, carinate; upper cells subquadrate.

I. **Eu-Bartramia**.

1. **Ithyphyllæ**.

A. Leaves gradually narrowed, reflexed near base and not distinctly sheathing; costa excurrent outside the subula.

1. *B. stricta* Bridel.

Capsule gen. erect; peristome simple; pedicel exserted. Tufts glaucous green above. Synoecious. — Siliceous ground r. *Eur.* princ. in Mediterr. distr. France: Schimper. Italy: Bottini. *Amer.* »U. S.»: Lesq. et Jam.

B. Leaves abruptly narrowed from the not reflexed us. hyaline sheath; costa more or less filling subula.

2. *B. ithyphylla* Bridel.

Capsule inclined; peristome us. double. Costa of leaves not well-defined above but us. not wholly filling subula. Tufts us. glaucous green. Synoecious. — On stone. *Eur.* common. Sweden, Norway, Switzerl. *Amer.* Greenl.: Vanhoeffen. Alaska: J. M. Macoun. Can.: J. Macoun; Waghorne.

* *B. breviseta* Lindberg.

Capsule deflexed when young, suberect when old; peristome simple rudimentary or wanting; pedicel scarcely exserted. Costa filling subula of leaf. — Northern princ. arctic district r. *Eur.* »Norway: Th. Fries»: Lindberg. *Amer.* Alaska: J. M. Macoun. Can.: Waghorne.

* *B. rigidula* (Schimper as var.) Kindb. n. subsp.

Capsule smaller; pedicel exserted. Leaves rigid brittle appressed when dry. — Alp. and arctic distr. r. *Eur.* Norway! *Amer.* »Greenl.»: Lange.

3. *B. viridissima* Bridel. — »*Weisia* Brid. 1826»: Limpr. — *B. subulata* Br. eur. 1846.

Differs from *B. ithyphylla*: Capsule smaller, erect when moist; peristome simple rudimentary us. wanting. Leaves smaller; costa often not defined in subula. Paroecious. — Rocks in higher alp. and arctic distr. r. *Eur.* Switzerl. Austria: Breidler. *Amer.* Greenl.: Vanhoeffen. »Alaska and U. S.»: Lesq. et Jam.

2. Crispæ.

A. Upper leaf-cells short-rectangular. Leaves crowded very distinctly sheathing, more or less flexuous but not crisped.

4. *B. norvegica* Gunner. — *Bryum* Gunn. 1772; *Bartramia* Lindb.; *Webera Halleri* Hedwig 1782; *Bartramia* Hedw. 1789.

Leaves not decurrent, abruptly tapering and long-subulate; costa long-excurrent. Pedicel not much longer than capsule. Monoecious or subparoecious. — Rocks often near cascades. *Eur.* not r., nearly common in alps. Sweden, Norway, Switzerl. *Amer.* r. »Can. Rocky mts: Drummond»: Lesq. et Jam.

B. Upper leaf-cells subquadrate. Leaves crisped or circinnate.

a. Leaves crowded, not distinctly sheathing.

5. **B. pomiformis** L. — Bryum L.; Bartramia Hedwig.

Leaves nearly gradually tapering and long-subulate, not decurrent, crisped; costa not long-excurrent. Pedicel exerted above shoots. Monoecious or subparoeocious. — On earth princ. on rocks. *Eur.* common. Sweden, Norway, Switzerl.! *Amer.* Can.: Macoun; Waghorne. U. S.: Sullivan, com. C. M.

b. Leaves sheathing, more or less distant.

6. **B. crispa** Swartz.

Leaves nearly gradually tapering to a not long subula, not decurrent, circinnate; costa not long-excurrent. Perichetial leaves with very long-excurrent costa. Pedicel us. not exerted above shoots. Tufts sparingly radiculose, green or dark green. Paroeocious or synoeocious. — Rocks not r. *Eur.* Sweden! *Amer.* Can.: Macoun.

7. **B. glaucoviridis** C. M. et Kindb. l. c.

Leaves sublinear abruptly short-subulate subcircinnate not decurrent; costa subpercurrent or short-excurrent. Pedicel not long. Tufts glaucous green very radiculose. Subparoeocious. — Wet rocks in alps r. *Amer.* Can. B. C. near Revelstoke: Macoun.

8. **B. circinnulata** C. M. et Kindb. l. c.

Leaves abruptly tapering and long-subulate circinnate decurrent; costa very long-excurrent. Capsule and flowers unknown. Tufts bright green sparingly radiculose. — *Amer.* r. Can. Brit. Col.: Macoun.

II. Plagiopus Bridel.

9. **B. Oederi** Gunner. — Bryum Gunn.; Bartramia Swartz.

Leaves gradually narrowed short-subulate not sheathing, slightly curling; upper cells subquadrate; costa percurrent. Capsule erect when moist, sometimes small. Tufts compact. Synoeocious. — Rocks princ. in alps. *Eur.* common in subalp. region. Sweden, Norway, Switzerl.! *Amer.* Can.: Macoun.

189. **Philonotis** Bridel.

I. **Eu-Philonotis**. Male flowers disciform with more or less patent leaves. Dioecious.

1. **Homomorphæ**. Leaves nearly uniform small narrow, serrate (without double mamillæ at borders), not falcate, often distant. Perigonal leaves acuminate acute. Stem often subcapillary.

2. **Dimorphæ**. Leaves gen. dimorphous and large, r. distant: some short subovate with us. not recurved borders, the others gen. ovate-lanceolate or ovate-oblong, often recurved at base and sometimes falcate; borders serrate or furnished with double mamillæ. Stem gen. long and thick with long branches.

II. *Philonotula*. Male flowers gemmiform with erect leaves. Monoecious or dioecious. Leaves small narrow, nearly erect when moist, not reflexed, faintly mamillöse without double mamillæ, often nearly appressed when dry. Fruiting stem very short.

I. *Eu-Philonotis*.

1. *Homomorphæ*.

A. Leaves not recurved at borders.

1. *Ph. marchica* Willdenow. — *Leskia* Willd.; *Philonotis* Brid.

Leaves ovate-lanceolate acute not sharply serrate, more or less distant; shoot-leaves somewhat shorter; costa short-excurrent. Perigonal leaves erect-patent ovate-lanceolate nearly subulate-acuminate; costa distinct often excurrent. Inner perichetial leaves short, not or scarcely reaching above vaginula. Stem somewhat long. — Wet places in lower districts. *Eur.* not common. *Switzerl.* France: Husnot. Germany: Warnstorf. *Amer. r.* Can.: Macoun. U. S.: Roell.

*** *Ph. laxa*** Limpricht.

»Leaves very distant; costa not excurrent. — *Eur. r.* *Switzerl.* and Germany»: Limpricht.

2. *Ph. Muehlenbergii* Bridel.

Differs from the last: Leaves smaller, more distant; costa long-excurrent; stem thinner, subcapillary; capsule smaller. — Springs in sandy rocks *r.* *Amer. Can.* Macoun. U. S.: Roell; Sullivan, com. C. Mueller.

3. *Ph. Macounii* Lesquereux et James.

Leaves ovate-oblong or broadly ovate-lanceolate, long-subulate, sharply serrate princ. above, crowded, smaller and shorter than in *Ph. marchica*; costa long-excurrent. Perigonal leaves horizontally spreading, ovate-lanceolate acute not subulate; costa not well-defined, obsolete not excurrent. Inner perichetial leaves reaching far above vaginula with long-excurrent costa. Stem somewhat short. — *Amer. r.* Can. Pacif. distr.: J. Macoun.

B. Leaves (at least some ones) recurved, ovate-lanceolate. Capsules not seen. Stem us. subcapillary.

a. Leaves nearly smooth and not sharply serrate; costa short-excurrent.

4. *Ph. Arnellii* Husnot m. G. — »*Ph. parvula* Lindb.»: Philibert.

Leaves distant long-subulate short-decurrent. Perigonal leaves ovate-lanceolate subulate horizontally patent; costa excurrent. — Wet rocks *r.* *Eur.* Sweden: Zetterstedt. *Amer.* Greenl.: Wenck, com. Roell.

5. **Ph. subcapillaris** Kindberg n. sp. — *Ph. capillaris* Lindb. ?

Leaves nearly crowded, shorter acuminate than in the last: perigonal patent erect subovate short acuminate with not excurrent costa, the inner sometimes obtuse. — Wet earth r. *Eur.* Switzerl. near Lugano!

b. Leaves very mamillöse and sharply serrate; costa long-excurrent.

6. **Ph. vancouveriensis** Kindb. n. sp.

Leaves long-subulate: perigonal patent-erect broadly ovate-lanceolate acute nearly nerveless. — *Amer.* r. Can. Vanc. isl.: J. Macoun. Alaska: J. M. Macoun.

2. Dimorphæ.

A. Leaves smooth or only at borders furnished with few double mamillæ; cells very pellucid somewhat large.

7. **Ph. glabriuscula** Kindb. cat. Can. m.

Leaves not long gen. decurrent, nearly appressed when dry; those of shoots spreading. Capsules and flowers unknown. — Springs r. *Amer.* Can.: Moser; Waghorne. U. S.: Roell.

B. Leaves very mamillöse also at the inner cells.

a. Perigonal leaves acute distinctly costate.

8. **Ph. calcarea** Br. eur.

Leaves large gen. serrate without double mamillæ, us. long crowded and falcate: perigonal us. horizontally spreading. Tufts gen. very high. — Calcareous rocks and swamps. *Eur.* not r. Sweden! Switzerl.: Schimper. Greece: Heldreich. *Amer.* r. U. S.: Lesq. et Jam.

* **Ph. mollis** Venturi.

Leaves of sterile stems very distant. Tufts low and loose. — *Eur.* Austria: Venturi. Portugal: com. Venturi. Sweden!

* **Ph. cæspitosa** Wilson.

Leaves more dimorphous, often with some double mamillæ at borders, gen. not crowded: perigonal patent-erect. — Swamps. *Eur.* not common. Belgium: Gravet. Germany: Warnstorf. *Amer.* Greenl.: Lange. U. S.: Cardot.

9. **Ph. alpicola** Juratzka.

Differs from *Ph. calcarea*: Leaves shorter and broader, more recurved and us. appressed with patent point, either serrate or partly with double mamillæ, r. falcate. Perigonal leaves us. patent-erect. — In alps r. *Eur.* Norway, Switzerl. *Amer.* Can.: Waghorne. Greenl.: Vanhoeffen.

10. **Ph. acutiflora** Kindb. in Hedwigia 1896 p. 67.

Leaves not serrate and not falcate, recurved to or above

middle, with double mamillæ, gen. appressed when dry, smaller than in *Ph. calcarea*. Perigonial leaves horizontally spreading. Tufts not high; fruiting stem very low. — *Amer.* r. *Can.*: Macoun. U. S.: Roell.

b. Perigonial leaves gen. all obtuse subovate, the inner not distinctly costate.

11. **Ph. fontana** L. — *Mnium* L.; *Philonotis* Bridel.

Leaves plicate below, us. with numerous double mamillæ, mostly crowded: perigonial obtuse patent-erect. Tufts us. glaucous green. — Wet places common and very variable. *Eur.* Sweden, Norway, Switzerl. Greece: Heldreich. *Amer.* *Can.*: Macoun; Waghorne.

* **Ph. seriata** Mitten. — *Bartramia* Mitt.; *Philonotis* Lindb.

Shoot-leaves gen. distant, spirally twisted when dry. — Rivulets in alps not common. *Eur.* Norway! France: Gasilien. *Amer.* *Can.*: J. Macoun. Alaska: J. M. Macoun.

* **Ph. gracilescens** Schimper. — *Ph. fontana* *angustifolia Kindb. Laubm. Schw. u. Norw.

Leaves (nearly all) small and narrow, often not recurved, those of shoots gen. distant: perigonial subacute at least the outer. Stem somewhat thin. Habit of *Ph. marchica*. — Wet rocks princ. in alps. *Eur.* not common. Sweden, Norway! France: Husnot. Spetsbergen: R. Gyllencreutz.

c. Perigonial leaves not seen. Other leaves not plicate.

12. **Ph. Mohrii** C. M.; *Bartramia* C. M., *Philonotis* Lq. et Jam.

Leaves crowded, resembling those of *Ph. fontana*, but minutely serrulate above, gen. with double mamillæ below, not distinctly plicate, reflexed below, straight, open also when dry; costa long-excurrent. Capsule faintly plicate when dry; lid umbonate. Stem not high; pedicel as long. — Rotten logs r. *Amer.* U. S.: Louisiana: Mohr, com. C. Mueller.

13. **Ph. adpressa** Ferguseon; Braithwaite.

Leaves with gen. double mamillæ, broad-ovate uniform, distant decurrent nearly appressed when dry; costa gen. not excurrent. Tufts long loose nearly eradiculose. Capsules unknown. — Wet places r. *Eur.* »Engl.»: Braithwaite. *Amer.* Greenl.: Vanhoeffen.

II. *Philonotula* C. Mueller.

A. Leaves serrulate all around, narrowly ovate-lanceolate.

a. Leaves subulate at apex; costa excurrent. Monoecious.

14. **Ph. rigida** Bridel.

Leaves faintly papillose or mamilllose nearly crowded, us.

appressed when dry. Perichetial leaves long from broad base abruptly subulate. Capsule somewhat large. Fruiting stem very short with few stem-leaves and short verticillate branches. — Wet rocks in warmer districts r. *Eur.* Switzerland. France: Philibert. Spain: Levier. Italy: Bottini. Engl.: Holt.

15. **Ph. radicalis** Beauvois. — Bartramia Beauv.; Sulliv. icon. musc.; Philonotis Kindb.

Differs from the last: Leaves more gradually acuminate: perichetial longer-subulate; costa short-excurrent; branch-leaves often open-erect when dry. Capsule somewhat smaller; pedicel thinner. — Wet places r. *Amer.* Can. Brit. Col. and Vancouver isl.: Macoun. U. S.: Mohr, com. Macoun.

b. Leaves acute not subulate; costa percurrent. Dioecious.

16. **Ph. tenella** C. Mueller.

Leaves crowded appressed when dry, smaller than in the last: perichetial subulate not much broader; perigonal sublinear long-subulate nearly nerveless. — *Amer.* r. U. S.: C. M. (Cuba: Wright, herb. Sullivant, com. C. Mueller).

B. Leaves entire and nearly smooth in lower half, sublinear-subulate. Capsules and flowers unknown.

17. **Ph. pumila** Kindb. n. sp.

Leaves erect, smaller and narrower than in *Ph. rigida*; costa scarcely excurrent. Tufts about 1 c. m. high. — *Amer.* r. Can. Ontario near Belleville: Macoun.

140. **Anacolia** Schimper.

1. **A. Menziesii** Turner. — Bartramia Turn.; Sulliv. ic. m.; Anacolia Kindb.

Leaves smooth from subovate base nearly gradually subulate, serrate to the plicate basal part, nearly appressed when dry; lower cells short-rectangular, upper longer; costa short-excurrent or percurrent. Capsule globose pale or reddish brown; teeth short or none; pedicel us. longer than capsule to 1 c. m. Tufts green soft and silky, tomentose. Dioecious. — Rocks r. *Amer.* Can. Pacif. distr.: Macoun. U. S.: E. Hall; Leiberg, com. Mrs Britton.

2. **A. Webbii** Montagne. — Glyphocarpus Mont.; Anacolia Sch.

Differs from the last: Leaves mamilliose brittle serrate in upper third; cells gen. quadrate: middle rectangular. Capsule red-brown; pedicel shorter; teeth none. Tufts rigid brown-green. — Earth and rocks r. *Eur.* Mediterr. distr. »Spain and Corsica: Schimp (Canary islands: Husnot).

141. **Bartramidula** Bruch et Schimper.

1.B.Wilsoni Br. et Sch. — *Philonotis Braithw.*; *Bartramia* C. M.

Leaves from suboblong entire base tapering to the serrulate acute acumen; upper cells longer-rectangular, the lower shorter; costa not percurrent. Capsule small globose-piriform with short neck; pedicel longer. Tufts scarcely 1 c. m. high. — Rocks r. *Eur.* Engl.: Rogers; George. Scotl.: Fergusson.

142. **Catoscopium** Bridel.

1.C.nigritum Hedwig. — *Weisia* H.; *Catoscopium* Brid.

Leaves small entire ovate-oblong or broadly ovate-lanceolate acuminate acute; costa percurrent. Capsule red-brown finally blackish glossy, resembling a pinhead in size; pedicel red. Spores about 0,04 m. m. Dioecious. — Swamps and turfy soil in alps or as relics from glacial periode. *Eur.* common in northern alps. Sweden, Norway, Switzerl. Spetsbergen: Berggren. Engl.: Manchester Crypt. society. *Amer.* r. Can.: Macoun.

143. **Conostomum** Swartz.

1.C.boreale Swartz.

Leaves gradually tapering to the subulate apex, faintly serrate in upper part of acumen; costa not or slightly excurrent. Capsule inclined; pedicel much longer. Tufts glaucous green. — Rocks in or near alps. *Eur.* not r. in northern distr. Norway! Sweden! Wahlenberg. *Amer.* r. Can.: Macoun. Greenl.: Van-hoeffen.

Fam. 31. **Funariaceæ.**

144. **Funaria** Schreber.

I. Eu-Funaria. Peristome double. Capsule gen. oblique often annulate.

1. **Annulatæ.** Capsule annulate us. rugose or furrowed when dry; endostome short. Leaves entire. Spores mostly about 0,01 m. m.

2. **Exannulatæ.** Capsule not annulate, slightly or not rugose. Leaves us. serrate. Spores about 0,02 m. m.

II. Entosthodon. Peristome simple or none. Capsule not rugose, us. symmetric; annulus none; pedicel short. Leaves serrate, entire or indistinctly sinuate.

I. Eu-Funaria.

1. **Annulatæ.**

1.F.hygrometrica L. — *Mnium* L.; *Funaria* Sibthorp.

Leaves us. ovate-oblong acute subconvolute not distinctly

acuminate; costa subpercurrent. Capsule oblique; teeth red with prominent ribs also below; segments well-evolute; lid not umbonate; pedicel us. very long. Spores about 0,01 m. m. — On bare earth common. *Eur.* Sweden etc.! *Amer.* Can.: J. Macoun.

* **F. calvescens** Schwægrichen.

Leaves lanceolate short-acuminate not convolute, crisped. Stem higher. — *Eur.* Switzerl.! Greece: Orphanides. *Amer.* Can. Vanc. isl.: Macoun.

* **F. Ravenelii** Austin.

»Comal leaves narrower, spreading; costa percurrent. — *Amer.* U. S.»: Lq. et Jam.

2. **F. convoluta** Hampe.

Differs from *F. hygrometrica*: Capsule smaller, finally furrowed; teeth yellowish; endostome often rudimentary; lid umbonate. Leaves sometimes short acuminate. — *Amer.* r. U. S. Pacif. distr. near Washington: Roell.

3. **F. arctica** Kindb. n. sp. — *F. hygrometrica* var. *arctica* Berggren.

Resembling a small state of *F. hygrometrica* with smaller leaves and capsules. Differs from it: Spores twice as large, about 0,02 m. m. Leaves ovate mostly obtuse. Peristomial teeth with prominent ribs only near apex; pedicel short. — Earth in arctic distr. r. *Amer.* Greenl.: Berggren.

4. **F. microstoma** Bryol. eur.

Resembling *F. hygrometrica*. Differs from it: Capsule smaller, less rugose often pale; pedicel short; endostome very short or rudimentary; spores 0,02 m. m. Leaves smaller, more or less acuminate. — Wet sand or clay in alps & *Eur.* Switzerl.! Austria: Breidler. France: Brébisson. *Amer.* »U. S.»: Lq. et Jam.

5. **F. flavicans** Michaux; Lesquer. et Jam.

Leaves ovate-oblong or obovate, abruptly attenuate to a long subulate or acicular point; costa sometimes excurrent. Capsule not or slightly rugose when dry; teeth with prominent ribs only at point; endostome rudimentary; lid umbonate; pedicel not long. Spores about 0,02 m. m. or larger. — *Amer.* r. U. S.; Vasey, com. Macoun.

2. Exannulatæ.

A. Capsule oblique; endostome nearly as high as teeth.
6. **F. serrata** Beauvois; Sulliv. icon. muscor.

Leaves ovate-oblong or ovate-lanceolate, gen. short-acuminate, serrate above; costa subpercurrent. Capsule slightly rugose when

dry; teeth without prominent ribs; lid umbonate; pedicel somewhat long. — Moist clay and sand r. *Amer.* U. S.: Langlois, com. Cardot.

7. *F. americana* Lindberg; Sulliv. l. c.

Leaves ovate or ovate-oblong, obtusate or tapering to a long acicular point, entire or faintly serrate; costa sometimes not percurrent. Capsule not rugose; teeth sometimes with prominent ribs in lower part; lid obtusely apiculate; pedicel short. — *Amer.* r. U. S. Montana: Williams, herb. Demetrio, com. Roell.

B. Capsule not rugose, r. straight; endostome short.

8. *F. calcarea* Wahlenberg.

Leaves oval-oblong or subobovate tapering to a gen. long subacicular point; upper us. serrate; costa us. not percurrent. Capsule oblique; pedicel short. — Calcareous soil in warmer districts. *Eur.* not r. Sweden! Austria: Breidler. France: Husnot. *Amer.* r. »Can. and U. S.»: Lesq. et Jam.

*** *F. Muehlenbergii* Schwægrichen: C. M.**

Leaves us. gradually narrowed with subpercurrent or excurrent costa. — *Eur.* Switzerl.! France: Husnot. Germany: W. Baur, com. C. Mueller.

*** *F. mediterranea* Lindberg.**

Leaves us. entire and abruptly narrowed with abbreviate costa. — *Eur.* Italy: E. Adlerz. *Amer.* »U. S.»: Lesq. et Jam.

*** *F. convexa* Spruce.**

Leaves larger and faintly serrate. Lid of capsule not umbonate. — *Eur.* southern distr. r. Italy: Bottini. France: Philibert. Greece: Haussknecht; Heldreich.

*** *F. pulchella* Philibert.**

Leaves smaller; costa short. — *Eur.* r. France: Philibert.

9. *F. californica* Sullivant et Lesquereux; Sull. ic. m.

Leaves oval-oblong or subobovate subobtusate or very shortly acuminate without acicular point, entire or serrate; costa not percurrent. Capsule oblique (or erect symmetric) long-necked; teeth with slightly or not prominent ribs; lid umbonate; pedicel short. — Clay soil r. *Amer.* U. S. Calif.: Bolander, com. Renauld. — In Sulliv. icon. muscor. capsule is straight, leaves are entire.

*** *F. pallescens* Juratzka. — Entosthodon Jur.; Funaria Kindb.**

Capsule always straight symmetric; endostome very short; spores a little larger; lid not seen. Leaves entire. — *Eur.* r. Greece: Haussknecht.

II. Entosthodon Schwægrichen.

A. Leaves gen. serrate acute or short-acuminate. Peristome rudimentary or wanting.

a. Capsule subglobose short-necked; pedicel straight longer.

10. F. obtusa Dickson. — Bryum Dicks.; Funaria Lindb.; Entosthodon ericetorum Balsamo et Notaris.

Leaves ovate-oblong or broadly ovate-lanceolate, broadly limbate by narrow cells, sometimes nearly entire. Peristome none. Spores smooth. — Clay and sand. *Eur.* not common. Norway: R. Hartman. Sweden: J. Persson. Germany: Herpell.

11. F. fascicularis Dickson. — Bryum Dicks.; Funaria Schimp.

Leaves subobovate strongly serrate not limbate. Peristome rudimentary. Spores very rough. — Open fields princ. in warmer districts. *Eur.* not r. Sweden: S. A. Tullberg. France: Husnot. Germany: Warnstorf.

b. Capsule piriform long-necked; pedicel inclined scarcely longer.

12. F. curviseta Schwægrichen. — Gymnostomum Schw.; Funaria Milde; Entosthodon Schimper.

Leaves as in the last. Peristome none. Spores verrucose. — Rocks and walls r. *Eur.* France: Husnot. Italy: Giordano; Arcangeli.

B. Leaves entire or indistinctly sinuate. Peristome simple well-evolute. Pedicel straight somewhat long.

13. F. attenuata Dickson. — Bryum Dicks.; Funaria Lindb.; F. Templetoni Smith; Entosthodon Schwægrichen.

Leaves subobovate abruptly short-acuminate limbate by one yellow cell-row. Capsule suboval shorter than neck; teeth articulate; spores smooth. — Humid earth r. *Eur.* princ. near Atlantic and Mediterr. seas. France: Le Jolis; Husnot. Italy: Venturi. Portugal: Levier. Engl.: Percival. *Amer.* »U. S. Calif.«: Lesq. et Jam.

14. F. Drummondii Sullivant. — Entosthodon Sull. icon. musc.; Funaria Kindb.

Differs from the last: Leaves gen. not acuminate. Capsule short-piriform longer than neck; teeth indistinctly articulate; spores slightly rough. — Moist clay soil r. *Amer.* U. S.: Langdon, com. Cardot.

145. Physcomitrium Bridel.

I. In Physcomitrium. Capsule short-necked; peristome none. Leaves long-cystate.

1. Erythrocarpa. Capsule (as pedicel) red, very dilated at mouth.

2. **Xanthocarpa.** Capsule (as pedicel) yellowish, not or very r. dilated at mouth.

II. **Pseudo-Funaria.** Capsule long-necked; teeth pale indistinctly articulate. Leaves nerveless or short-costate. (Calyptra 4-lobed as in other species.)

I. **Eu-Physcomitrium.**

1. **Erythrocarpa.**

A. Capsule somewhat large; lid flat.

1. **Ph. acuminatum** Schleicher. — *Gymnostomum* Schl.; *Physcomitrium* Bruch et Sch.

Upper leaves long-lanceolate sharply acuminate, entire at least above, yellow-margined below; costa percurrent or short-excurrent. Lid of capsule mamillate. — Earth princ. on walls r. *Eur.* Switzerl. Austria: Gander. *Amer.* »U. S.«: Lesq. et Jam.

2. **Ph. Hookeri** Hampe. — *Ph. hians* Lindb.; Sulliv. ic. m.

Leaves suboblong acuminate entire or serrate; costa not percurrent. Lid of capsule apiculate. — Wet meadows r. *Amer.* Can.: Macoun; Dearnass. U. S.: Henderson, com. Cardot.

B. Capsule small. Leaves suboblong.

3. **Ph. sphaericum** Ludwig. — *Gymnostomum* Ludw.; *Physcomitrium* Bridel.

Leaves obtuse or obtusate gen. entire; costa not percurrent. Lid of capsule flat apiculate. — Earth near water in lower distr. r. *Eur.* Engl.: Rogers. Finl.: Brotherus.

4. **Ph. eurystomum** Esenbeck. — *Gymnostomum* Es.; *Physcomitrium* Sendtner.

Leaves short-acuminate serrate above; costa percurrent or excurrent. Lid of capsule convex mamillate. — Earth r. *Eur.* Italy: Venturi. Germany: Ruthe. Austria: Broidler.

2. **Xanthocarpa.**

A. Pedicel of capsule not emergent above upper leaves; lid convex.

a. Capsule immersed.

5. **Ph. immersum** Sullivant icon. *muscor.*

Leaves narrowly oblong-lingulate or lanceolate short-acuminate, sharply serrate above; costa not percurrent. Capsule globose with dilated mouth; lid mamillate. — River banks r. *Amer.* Can.: Macoun.

6. **Ph. coloradense** Britton bull. *Torr. club* 1894.

Leaves subovate obtusate or short-pointed, slightly serrate above; costa percurrent. Capsule subglobose-piriform; lid apiculate. — *Amer.* »U. S. r.«: Mrs Britton.

b. Capsule emergent shorter than pedicel.

7. *Ph. pygmæum* James.

Leaves suboblong acute or short-acuminate, slightly serrate above; costa not percurrent. Capsule oblong-piriform; lid apiculate. — Earth in alps 1. *Amer.* »U. S. Utah»: Lq. et Jam.

B. Pedicel of capsule long-exserted.

a. Lid of capsule flat when ripe and moist.

8. *Ph. piriforme* L. — *Bryum* L.; *Physcomitrium* Bridel; *Ph. Drummondii* Britton.

Upper leaves oblong-lanceolate not sharply acuminate, serrate above; costa not percurrent. Capsule not or slightly strangulate when dry; lid apiculate. — Wet earth and walls. *Eur.* common in lower districts. Sweden! Engl.: Rogers. France: Husnot. *Amer.* Can.: Macoun.

9. *Ph. turbinatum* Richard. — *Ph. Kellermani* Britton l. c.

Upper leaves long-lanceolate sharply acuminate serrate above; costa percurrent or short-excurrent. Capsule often strangulate when dry; lid us. mamillate, sometimes short-pointed. — *Amer.* r. Can.: Dearness. U. S.: com. Macoun; Boll and Brendel, com. C. Mueller.

b. Lid of capsule convex us. mamillate.

10. *Ph. megalocarpum* Kindb. bull. Torr. club XVI.

Upper leaves long-lanceolate sharply acuminate nearly entire yellow-margined; costa percurrent or short-excurrent. Capsule us. large r. slightly strangulate. — *Amer.* Pacif. distr. Can.: Macoun. U. S.: Henderson, com. Cardot.

*** *Ph. californicum* Britton l. c.**

»Leaves shorter, oblong-lanceolate sometimes not sharply acuminate; costa not percurrent. Capsule smaller, slightly strangulate. — *Amer.* U. S.: Mrs Britton.

11. *Ph. Langloisii* Renaud et Cardot. — *Ph. australe* Britton l. c.

Differs from *Ph. megalocarpum*: Leaves serrate all around, not or less distinctly yellow-margined; capsule not large, sometimes strangulate when dry; lid sometimes apiculate. — *Amer.* r. U. S.: Langlois, com. Cardot; C. Roell, com. J. Roell.

12. *Ph. platyphyllum* Kindb. cat. Canad. m.

Leaves broad ovate-oblong: upper sharply acuminate serrate above; costa percurrent or short-excurrent. Capsule not large, not distinctly strangulate when unripe. — *Amer.* r. Can.: Fletcher, com. Macoun.

II. *Pseudo-Funaria* Kindb.

13. Ph. Bolanderi Lesquereux. — *Entosthodon* Lesq.; Sull. ic. m.; *Physcomitrium* Kindb.

Leaves from subobovate base abruptly narrowed to a short subulate acumen, nearly entire. Capsule piriform; pedicel not long; lid convex mamillate; calyptra with very long beak. — Clay soil r. *Amer.* »U. S. Calif.: Bolander»; Sullivant.

146. Pyramidula Bridel.

1. P. tetragona Bridel.

Upper leaves ovate short-acuminate acute entire; cells larger than in *Pottia truncatula*; costa us. excurrent. Capsule subglobose with short thick neck; lid short obtuse; calyptra vertically splitting. Spores 0,04—0,07 m. m. Monoecious. — Meadows princ. cloverfields in early spring. *Eur.* less r. Sweden: Hartman. Germany: Huebner. *Amer.* r. »U. S.»: Lesq. et Jam.

147. Discelium Bridel.

1. D. nudum Dickson. — *Bryum* Dicks.; *Discelium* Brid.

Leaves ovate-oblong or broadly ovate-lanceolate nearly hyaline. Capsule cernuous very small; pedicel thin reddish. Protonema evolute in the autumn. Dioecious. — Wet sand viz. by rivers r. *Eur.* Sweden! Norway: F. Nyman. Germany: Schemmann. *Amer.* »U. S.»: Lesq. et Jam.

Fam. 32. **Bryaceæ.**

148. Leucolepis Lindberg.

1. L. acanthoneura Schwægrichen. — *Hypnum* Schw.; *Leucolepis* Lindb.; *Bryum* Menziesii Hooker; *Mnium* C. M.

Leaves distant long-decurrent simply serrate not limbate. Lower leaves squamiform hyaline, orange at base, gen. long and ovate-lanceolate long-acuminate cuspidate. Upper stem-leaves ovate short-acuminate or filiform-pointed. Branch-leaves ovate-oblong or broadly ovate-lanceolate acute carinate; costa dentate at back, not excurrent. Outer perichetial leaves long-acuminate; costa long-excurrent. Capsule large *Mnium*-like brown-red inclined or cernuous; pedicels long, often in pairs; lid not seen. Tufts loose tomentose at base. Dioecious. — Earth and logs in woods. *Amer.* Pacif. distr. r. Can.: Macoun. U. S.: Howell, com. Cardot.

149. Rhizogonium Bridel.

1. R. spiniforme L. — *Hypnum* L.; *Rhizogonium* Bruch.

Lowest leaves short; the others distant long sublinear short-



1.5 1.8 2.0 2.2 2.5 2.8 3.2 3.6 4.0 4.5 5.0 5.6 6.3 7.1 8.0 9.0 10.0 11.2 12.5 14.0 16.0 18.0 20.0 22.5 25.0 28.0 32.0 36.0 40.0 45.0 50.0 56.0 63.0 71.0 80.0 90.0 100.0

10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100

subulate thickened at the doubly dentate margins, flexuous when dry, nearly straight when moist; costa short-excurrent. Outer perichetial leaves short simply dentate; costa long-excurrent. Capsule subobovate faintly curved; lid with short red beak; teeth brown, pale at apex; endostome yellow; cilia short-appendiculate; pedicel subbasilar pale red very long. Tufts tomentose below, often high. Synoecious. Habit of *Hypnace* in capsule and its lateral pedicel. — Swamps in subtropical districts. *Amer.* U. S.: Fitzgerald, com. Renauld (Cuba: Wright, com. C. Mueller).

150. *Timmia* Hedwig.

A. Sheath of leaves with finally red-brown cells; costa undentate at back. Dioecious.

1. *T. austriaca* Hedwig.

Leaves from broad sheath abruptly narrowed to the sublan-
ceolate in upper half serrate gen. obtuse and faintly involute
lamina, not or loosely appressed when dry. Capsule sulcate
when dry; cilia not appendiculate; lid apiculate. — Shaded
often dry rocks. *Eur.* not r. Sweden, Norway, Switzerland. *Amer.*
r. Can.: Macoun.

2. *T. arctica* Kindb. in botan. notiser 1893.

Leaves above sheath tapering to the broad-lanceolate obtuse
entire or to $\frac{1}{5}$ faintly denticulate not much narrower and
scarcely involute lamina, impressed at both sides above sheath,
appressed when dry and not much open when moist, much
smaller than in the last; costa nearly smooth. Stems not or
loosely tufted, about 3—4 c. m. high. Capsules unknown. —
Swamps in arctic districts r. *Eur.* Spetsbergen: R. Gyllencreutz
1883. *Amer.* »Greenl.»: Berggren.

B. Sheath of leaves with pale either hyaline or (in elder
leaves) pale brown cells; costa not dentate.

a. Lower leaves short gen. obtusate. Dioecious very r. fruit-
ing. Tufts pale green. »Cilia not appendiculate»: Juratzka.

3. *T. norvegica* Zetterstedt.

Upper leaves channelled longer acuminate, entire or indistinctly
denticulate in lower half; elder sheath-cells partly pale brown.
— Wet alp. rocks r. *Eur.* Norway, Switzerland. Spetsbergen: R.
Gyllencreutz. *Amer.* Can. Rocky mts: Macoun.

b. Cilia appendiculate. Leaves acuminate not short. Monoecious. Tufts brown below, green above.

4. *T. megapolitana* Hedwig.

Leaves channelled serrate in whole lamina; nearly all broadly

short-acuminate, only the uppermost long-acuminate; elder sheath-cells pale yellowish brown. — Wet meadows and swamps or r. on rocks. *Eur.* r. »Germany»: Limpricht. *Amer.* less r. Can.: Macoun. U. S.: Roell.

5. **T. bavarica** Hessler.

Differs from the last: Nearly all leaves subconvolute serrate in upper half; sheath-cells hyaline. — Crevices and caverns of rocks. *Eur.* not r. Norway! *Amer.* r. Can.: Macoun.

151. **Aulacomnium** Schwægrichen.

I. **Orthopyxis**. Capsule red-brown often straight; pedicel not very long. Male flowers gemmiform. Leaf-cells rotundate green nearly uniform. Tufts green not high. Not growing in swamps.

II. **Gymnocybe**. Capsule brown not straight; pedicel very long. Male flowers discoid. Upper leaf-cells round-angular, lowest basal larger us. brown. Tufts us. high large and yellowish. Dioecious. Growing in swamps.

I. **Orthopyxis** Palisot de Beauvois.

1. **A. androgynum** L. — Mnium L.; Aulacomnium Schwægrichen.

Leaves broader below, gradually tapering and sublinear subobtuse, denticulate above, recurved below to middle. Capsule straight subcylindric; teeth pale yellow; lid conic; pedicel longish. Often with globose pedicellate buds. Dioecious. — Rocks and stumps princ. in lower districts. *Eur.* common. Sweden, Germany! *Amer.* Can.: Macoun.

2. **A. heterostichum** Beauvois. — *Orthopyxis* Beauv.; Aulacomnium Br. eur.

Lower leaves obovate; upper suboblong subobtuse or apiculate, slightly reflexed near base, serrate nearly all around. Capsule oblong-cylindric often curved; teeth whitish; lid rostellate; pedicel not long. Monoecious. — On base of trees. *Amer.* eastern states. Can.: Macoun. U. S.: Green, com. Cardot.

II. **Gymnocybe** Ahnfelt et Fries.

3. **A. palustre** L. — Mnium L.; Aulacomnium Schwægr.

Leaves not cucullate, serrulate above, gen. sublanceolate, very papillose, us. twisted when dry. Inner perichetial leaves subulate; costa excurrent. Capsule often curved; lid rostellate. Tufts us. tomentose, often with pseudopodia (pedicellate buds). — Swamps common. *Eur.* Sweden, Switzerl.! *Amer.* Can.: Macoun; Waghorne.

* **A. papillosum** C. M. in Flora 1875.

Leaves with longer papillæ, long-decurrent; alar cells larger,

subrectangular. Capsules unknown. — *Amer.* U. S. Colorado: com. C. Mueller.

* **A.fasciculare** Bridel. — *Mnium* Brid.; *Aulacomnium* Kindb.

Leaves smaller and shorter, entire obtuse somewhat distant. — In alps r. *Eur.* »Austria»: Limpricht. *Amer.* Greenl.: Vanhoeffen.

* **A.imbricatum** Br. eur.

Leaves shorter, entire obtuse imbricate. Tufts nearly eradiculose. Habit of *A. turgidum*. — Princ. in alps, r. *Eur.* France: Payot, com. Husnot. *Amer.* Can.: Macoun.

* **A.polycephalum** Bridel. — *Mnium* Brid.; *Aulacomnium* Br. eur.

Leaves more acute and nearly subulate gen. small. Capsules unknown. — *Eur.* r. Belgium: Verheggen, com. Husnot.

4. **A.turgidum** Wahlenberg. — *Mnium* Wng; *Aulacomnium* Schwægr.

Leaves cucullate above, suboblong entire obtuse imbricate nearly smooth; costa somewhat short. Inner perichetial leaves subacute; costa not percurrent. Capsule nearly straight; lid not rostellate. Tufts nearly eradiculose without pseudopodia. R. fruiting. — Humid places princ. in northern alps. *Eur.* Norway not uncommon! Sweden: E. Nyman. Spetsbergen common: R. Gyllencreutz. *Amer.* Greenl.: Vanhoeffen. Alaska: J. M. Macoun. Can.: Macoun; Waghorne.

152. **Mnium** Linné, in part.

I. **Pseudo-Bryum**. Leaf-cells elongate suboblong. Leaves large nearly entire not distinctly limbate. Dioecious.

II. **Eu-Mnium**. Leaf-cells gen. round-hexagonal except the marginal and sometimes the inner near costa.

A. Leaves entire limbate; outer perichetial broad not long.

1. **Hymenophylloidea**. Leaves small, those of decumbent shoots distichous. Capsules unknown.

2. **Punctatiformia**. Leaves large not distichous; uppermost rosulate. Lid of capsule rostrate or rostellate.

B. Leaves entire or dentate us. not limbate; outer perichetial long narrow sublinear. Lid of capsule convex mamillate. Dioecious.

3. **Stellariformia**. Leaves bluish when moist; cells not large.

C. Leaves simply dentate, limbate by pale cells; costa excurrent. Outer perichetial leaves us. broad and not long. Stem often with decumbent stolons at base.

a. Leaves not linear.

4. **Cuspidatiformia.** Leaves gradually larger upwards not rosulate and not undulate, us. abruptly acuminate; teeth ciliiform; cells round-hexagonal us. not large. Lid of capsule submamillate. Us. synoecious.

5. **Rosulata.** Leaves us. obtuse or with short point and gen. not undulate; teeth r. ciliiform; cells large sometimes suboval. Upper leaves of fruiting stem rosulate. Lid of capsule mamillate-apiculate. Mostly dioecious.

6. **Rostrata.** Leaves obtuse often undulate; teeth not ciliiform; cells small round-hexagonal. Upper leaves of fruiting stem rosulate. Lid of capsule long-rostrate. Dioecious.

b. Leaves linear-lingulate.

7. **Undulata.** Leaves strongly undulate, the uppermost of fruiting stem rosulate; cells small round-hexagonal. Lid of capsule submamillate. Stems not tufted; shoots deflexed or the basal ascending. Dioecious.

D. Leaves doubly dentate (r. nearly entire), limbate by finally red cells. Outer perichetial leaves oblong-lanceolate. Stem r. with decumbent stolons. Leaf-cells gen. not large.

8. **Spinosa.** Upper leaves broad; costa excurrent. Capsules us. clustered; lid rostrate or rostellate.

9. **Serrata.** Upper leaves narrow; costa us. percurrent. Capsule us. solitary; lid rostrate or apiculate.

10. **Horna.** Leaves long narrow; costa not percurrent. Capsule solitary; lid mamillate. Tufts very tomentose.

I. Pseudo-Bryum Kindb.

1. **M.cinciidioides** M. N. Blytt.

Leaves gen. suboval obtuse; costa not excurrent. Capsule suboval; teeth brown. Tufts loose high. — Swamps princ. in northern distr. *Eur.* Norway! Sweden: M. Huss; Miss O. Cron. Belgium: Gravet. *Amer.* r. Can.: Macoun.

II. Eu-Mnium.

1. Hymenophylloidea.

2. **M.hymenophylloides** Huebener.

Leaves circular or round-oval gen. obtuse, pale-limbate glaucous or bright green; costa not percurrent. Stem net tomentose. — Alp. rocks r. *Eur.* Norway, Switzerl.! *Amer.* Can. Rocky mts: Macoun.

2. Punctatiformia.

A. Leaves narrowly limbate by 1—2 pale cell-rows, short-decurrent. Capsule broad-oval less large. Synoecious or dioecious.

3. *M. subglobosum* Br. eur

Leaves green spathulate at least the upper; inner cells gen. large. Inner perichetial leaves ovate subobtus; cells oblong-oval. Stem often tomentose. — Swamps princ. in northern alps. *Eur.* not common. Norway, Switzerl.! Sweden: R. Hartman. Spetsbergen: R. Gyllencreutz. *Amer.* r. Greenl.: Vanhoeffen. Can.: J. Macoun. Alaska: J. M. Macoun.

B. Leaves broadly limbate by 3—4 often red cell-rows, not decurrent. Capsule us. large suboval. Dioecious.

4. *M. punctatum* Schreber. — Bryum Schreb.; Mniura Hedwig.

Leaves broad-oval or round-oval finally blackish or reddish; innermost cells larger than the outer. Inner perichetial leaves ovate-lanceolate acuminate; cells sublinear. Stem us. tomentose. — Wet places. *Eur.* common. Sweden, Norway, Switzerl.! *Amer.* not r. Can.: J. Macoun. U. S.: Wetherby. Alaska: J. M. Macoun.

5. *M. glabrescens* Kindb. note on Canad. bryol. 1893.

Leaves oval-lingulate green or pale red, not nigrescent; the uppermost suboblong or oblong-lanceolate; cells smaller than in the last. Perichetial leaves as in *M. subglobosum*. Stem nearly glabrous. Pedicel often longer than in *M. punctatum*. — Earth and old logs. *Amer.* Pacif. distr. not uncommon. Alaska: J. M. Macoun. Can.: J. Macoun; Dawson. U. S. Calif.: Marshall A. Howe.

*** *M. chlorophyllosum* Kindb. n. subsp.**

Capsule (unripe) narrowly oblong. Leaf-cells very chlorophyllose. Stem tomentose. — Wet rocks r. *Amer.* Can. Ontario: Macoun.

3. Stellariformia.

6. *M. stellare* Reichard; Hedwig.

Leaves not or indistinctly limbate oblong-oval us. entire or the uppermost (of fruiting stem) denticulate above; shoot-leaves often distichous. — On rocks and base of trees. *Eur.* not uncommon. Sweden, Norway, Switzerl.! Austria: C. E. Kindberg. *Amer.* Can.: Macoun; Moser.

7. *M. Blyttii* Bryol. eur.

Leaves (at least on fruiting stem) red-limbate often doubly dentate, us. larger than in the last, not distichous. R. fruiting. — Rocks in northern alps r. *Eur.* Norway! *Amer.* Can.: Macoun.

4. Cuspidatiformia.

A. Leaves crowded dentate all around, spreading when

moist. Capsule yellowish finally red-yellow with red mouth; neck dark red tapering to pedicel. Sterile shoots erect often clavate.

8. **M. venustum** Mitten; Sulliv. ic. m. — *M. Neevii* C. M.

Leaves oval or subobovate; cells small. Capsules clustered often 4—6; endostomial membrane not perforated. — Trees and rocks r. *Amer.* Pacif. distr. Can.: Macoun. U. S.: Howell, com. Cardot.

B. Leaves not crowded, entire below, patent when moist. Capsule greenish finally brownish; neck not distinct.

9. **M. cuspidatum** Schreber. — *Bryum* Schreb.; *Mnium* Leysser.

Leaves suboblong long-decurrent; cells small. Capsule solitary; endostomial membrane perforated; lid apiculate. Tufts loose us. with numerous decumbent stolons. — Woods and rocks. *Eur.* common in lower distr. Sweden, Germany, Italy! *Amer.* Can.: Macoun.

10. **M. Drummondii** Bruch et Schimper; Sulliv. icon. m. — *M. submarginatum* Nawaschin et Zinger.

Leaves oval or subobovate, somewhat larger than in the last with longer teeth and larger cells. Leaves of fruiting stem short-decurrent. Capsules us. clustered 2—3; endostomial membrane not perforated; lid mamillate or obtuse. Tufts dense, r. with decumbent or decurved stolons. Sometimes with distinct male flowers. — Old logs in woods. *Eur.* r. Russia: Zinger, com. Zickendrath. »Germany»: Milde. *Amer.* less r. Can.: Macoun. U. S.: A. G. Wetherby.

5. Rosulata.

A. Leaf-cells gen. hexagonal-oval and seriate, at least the inner near costa. Dioecious.

11. **M. affine** Blandow.

Leaves oblong-oval or narrower, dentate all around (r. entire), us. short-decurrent; teeth us. long; nearly all inner cells suboval. Capsules often clustered 2—3. Tufts loose. — Wet grassy places. *Eur.* not r. Sweden, Norway, Switzerland! *Amer.* Can.: Macoun.

* **M. ciliare** Greville. — *Bryum* Grev.; *Mnium* Lindberg.

»Leaves with long ciliiform teeth»: C. M. syn. — *Eur.* »Sweden»: Lindberg. *Amer.* »U. S.»: Greville.

* **M. Seligeri** Juratzka et Milde.

Leaves gen. narrow and long-decurrent with short teeth. Capsule us. solitary. Shoots erect. — Rocks. *Eur.* not r. Sweden! Belgium: Gravet. *Amer.* »U. S.»: Lesq. et Jam.

12. **M. rugicum** Laurer.

Leaves oblong-oval or narrower, gen. entire and short-decurrent; the uppermost faintly dentate and not much larger than the lower, less distinctly rosulate; cells gen. round-hexagonal, the innermost near costa oval. Shoot-leaves nearly entire. Tufts loose. — Swamps r. *Eur.* Sweden, Norway! Germany: Warnstorf. *Amer.* Can. near Ottawa and N. Labrador: Macoun.

B. Leaf-cells round-hexagonal not seriate. Often synoecious. Leaves dentate all around, the uppermost rosulate.

a. Leaves very narrow, oblong-lanceolate acuminate; the outer perichetial longer acuminate. Plants robust.

13. **M. insigne** Mitten; Sullivant icon. muscor.

Leaves long-decurrent. Capsules us. clustered 3—5; lid us. mamillate. Stem us. with decumbent stolons. Tufts loose. Dioecious. — Wet ground r. *Amer.* Can. Pacif. distr. in Brit. Col.: Macoun.

14. **M. robustum** Kindb. n. sp. — *M. medium* * *robustum* Kindb. bull. Torr. club XVII.

Leaves not or very short-decurrent. Synoecious. Otherwise as the last. — Earth in bogs and woods r. *Amer.* Can. Vanc. isl.: Macoun.

b. Leaves short broad or only the uppermost narrow.

15. **M. medium** Bryol. eur.

Leaves not or slightly decurrent with not ciliiform teeth: lower oval-oblong obtuse, upper subobovate-lingulate, outer perichetial short-acuminate. Capsules us. in pairs or solitary; lid apiculate. Tufts loose. Shoots us. erect. Plants robust. Synoecious. — Wet rocks and woods. *Eur.* not common. Sweden, Switzerl.! Austria: Breidler. *Amer.* r. Can. Prince Edw. isl.: Macoun.

* **M. boreale** Kindb. n. subsp.

Pedical and stem very much shorter; leaves and capsules smaller. Leaves not decurrent. Capsule gen. solitary and straight; lid convex sometimes mamillate. Tufts dense. — Alp. rocks r. *Eur.* Norway in Dovrefjeld!

* **M. curvatulum** Lindberg. — *Astrophyllum* Lindb.; *Mnium* Limpr.

» Capsules clustered oblong-cylindric curved very wide-mouthed, smaller and shorter than in *M. medium*; lid depressed semi-globose conic not mamillate. Stems not tufted. Synoecious. — Alp. rocks r. *Eur.* Sweden in Lapland: Hj. Holmgren: Lindb. musci scand.

16. *M. arcticum* Kindb. in Biblioth. botan. 42 (1897).

Lower leaves decurrent with long ciliiform teeth, oblong obtuse; the uppermost oblong-lanceolate short-acuminate acute; outer perichetial ovate-lanceolate long-acuminate acute. Capsule solitary small (as in *M. cuspidatum*) suboval; pedicel not long. Tufts loose, about 2 c. m. high. Shoots erect. Dioecious. Habit of *M. cuspidatum*. — Arctic district r. *Amer.* Greenl. Karajak-Nunatak: Vanhoeffen.

6. Rostrata.

17. *M. rostratum* Schrader.

Leaves not or slightly decurrent: lower small rotundate or broad-oval; upper oval or broadly obovate obtuse, entire below. Capsules yellowish often clustered. Tufts loose. — Rocks and stonewalls. *Eur.* not r. in lower distr. Sweden, Switzerland. *Amer.* Can. not uncommon: Macoun.

7. Undulata.

18. *M. undulatum* Weis.

Leaves decurrent obtuse dentate all around. Capsules often clustered. — Wet woods in lower distr. *Eur.* nearly common. Sweden!; J. Persson. Denmark: M. F. Lange. Greece: Heldreich.

8. Spinosa.

19. *M. spinosum* Voit. — *Bryum* Voit; *Mnium* Schwægrichen.

Leaves curled when dry: upper subobovate; inner perichetial us. doubly dentate limbate. Tufts dark green loosely cohering. Dioecious. — Earth and rocks in woods, sometimes in alps. *Eur.* not uncommon. Norway, Switzerland. *Amer.* r. »U. S.»: Lesq. et Jam.

20. *M. spinulosum* Bryol. eur.

Leaves not or slightly curled: upper subobovate; inner perichetial us. simply dentate and not limbate. Tufts bright green densely cohering. Synoecious. — Base of trees. *Eur.* r. Austria: Schimper. France: Husnot. Germany: Progel. *Amer.* not r. Can.: Macoun; Dawson.

* *M. macrociliare* C. M. et Kindb. l. c.

Leaves dark-green smaller; teeth more ciliiform, sometimes simple. Capsule solitary. — *Amer.* r. Can.: Macoun.

9. Serrata.

A. Synoecious or paroecious without special male plants. Stem us. radiculose between lower leaves.

21. *M. marginatum* Dickson. — *Bryum* Dicks. 1790; *Mnium* Beauvois; *M. serratum* Schrader ? (1791); Br. eur.

Leaves long-decurrent; costa scarcely percurrent. Upper

stem-leaves suboblong subobtus short-acuminate, dentate above middle; lower leaves oval obtuse entire; shoot-leaves also entire. Capsule oval-oblong not strangulate, with not or slightly dilated mouth; lid rostellate or apiculate; teeth brownish. Tufts green or finally brownish green: us. dense, often high. — On earth. *Eur.* common. Sweden, Switzerl.! *Amer. Can.*: Macoun.

22. *M. Niagara* Kindb. cat. Canad. m.

Leaves gen. indistinctly decurrent. Upper stem-leaves lanceolate acuminate dentate to below middle, crowded and not decurrent; costa excurrent. Lower leaves oblong acute more or less dentate. Upper shoot-leaves also dentate. Capsule cylindric-fusiform strangulate wide-mouthed; lid obliquely rostrate; teeth yellow. Tufts loose dark green. — On earth under trees near water r. *Amer. Can. Niagara*: Macoun.

B. Dioecious (with separate male plants). Stem gen. not radiculose between leaves. Upper leaves us. dentate all around.

a. Leaves crisped (princ. on long us. decumbent stolons), gradually larger upwards on fertile stem; costa not excurrent.

23. *M. riparium* Mitten. — *M. ambiguum* H. Mueller.

Leaves oval-oblong subobtus, dentate all around, often crowded and not decurrent on fertile stem; shoot-leaves small distant us. long-decurrent; cells larger than in *M. orthorhynchum*. Capsule straight oblong-oval; teeth pale; lid rostellate. Stem not high. — Wet rocks r. *Eur.* Norway, Switzerl.! Sweden: E. Nyman. *Amer. Can.*: Macoun.

24. *M. umbratile* Mitten; Sullivant icon. m.

Leaves narrowly lanceolate acuminate very distant and long-decurrent. Capsule curved suboblong large often with long neck; teeth yellow; lid apiculate; pedicel often very long. — Wet rocks r. *Amer. Can. Brit. Col.*: Macoun.

b. Leaves faintly curled. Stem without decumbent stolons.

aa. Leaves distant long-decurrent. Tufts loose us. high.

25. *M. lycopodioides* Hooker. — *Bryum* Hook.; *Mnium* Schwægr.

Leaves lanceolate-acuminate gradually larger upwards; costa gen. excurrent. Capsule curved suboblong, larger than in *M. orthorhynchum*; teeth dark yellow or pale brown; lid rostellate. — Wet alp. rocks r. *Eur.* Switzerl. near Splügen! (*Asia*, Sikkim: Wichura, com. Mus. Berlin.).

26. *M. decurrens* C. M. et Kindb. l. c.

Lower leaves small oval-oblong; upper suddenly larger, lanceolate acute less distant; costa not excurrent. Capsule straight suboval; teeth dark yellow; lid apiculate. Stem often very

high. — Wet alp. rocks r. *Amer. Can.*: Brit. Col.: Macoun. U. S.: Roell.

bb. Upper leaves nearly crowded and not or shortly decurrent. Leaves gradually larger upwards. Tufts often low.
27. *M. orthorhynchum* Bridel.

Lower leaves suboval, upper suboblong gen. acute; costa not excurrent, us. dentate at back. Capsule straight suboval; teeth pale; lid rostellate. Tufts us. dense. Rocks princ. in alps. — *Eur.* not r. Norway, Switzerl. France: Husnot. *Amer. Can.*: Macoun.

28. *M. inclinatum* Lindberg.

Differs from the last princ. in shorter and smaller leaves; the lower rotundate or broad-ovate, the upper suboval subobtus. Capsule curved suboblong; teeth yellow; lid apiculate. Tufts often loose. R. fruiting. — Alp. rocks r. *Eur.* Norway, Switzerl. *Amer. Can.*: Drummond; Macoun. Greenl.: Vanhoeffen.

29. *M. pseudo-lycopodioides* C. M. et Kindb. l. c. — *M. lycopodioides* Lesq. et Jam.

Leaves as in *M. orthorhynchum* but gen. obtuse and more curled; costa not dentate, often excurrent. Capsule curved with distinct neck; teeth pale; lid rostellate. Tufts loose not high. — Base of trees in swamps r. *Amer. Can.*: Macoun.

10. Horna.

30. *M. hornum* L.

Leaves sublinear-lanceolate or oblong-lanceolate, not or scarcely decurrent. Capsule oblong or suboval; teeth pale. Tufts often high. Dioecious. — Rocks and woods. *Eur.* gen. common. Sweden, Norway! *Amer. Can.*: Macoun.

153. ***Roellia*** Kindb. revue bryol. 1896.

1. *R. lucida* Britton. — *Bryum* Britt.; *Roellia* Kindb.; *Mnium* Brotherus in Hedwigia 1893; *M. Roellii* Broth. in Bot. Centralblatt 1890.

Lower leaves distant ovate acute long-decurrent entire not limbate; upper crowded not decurrent, subspathulate with short often twisted acumen, serrate in upper third, faintly reflexed below, limbate by 2 narrow cellrows; upper cells oval-oblong, lower oblong or narrower; costa abbreviate or short-excurrent. Comal leaves oblong-lingulate. Perichetial leaves erect, shorter and much narrower, long-acuminate; inner nearly entire, neither limbate nor reflexed. Capsule long subcylindric pale rufous not constricted; teeth yellow; lid high-conic short-apiculate pale; pedicel very long, irregularly curved or geniculate. Tufts green.

— Near cascades in alp. regions r. *Amer.* U. S. Oregon 2100 metr. a. s.; J. Roell, com. Brotherus; Idaho 1350 metr. a. s.; Leiberg, com. Mrs E. G. Britton.

2.R.simplex Kindb. — *Bryum* Kindb. cat. Canad. m.; *Mnium* (Roellia) Kindb. revue bryol. 1896.

Nearly allied to the last but well-distinct. Differs from it: Leaves smaller, crowded and not decurrent. Comal leaves shorter, oval-spathulate. Shoot-leaves nearly similar, more numerous and not distant, not or indistinctly limbate. Capsule constricted below the wide mouth; lid obtuse. Endostome hyaline, cilia not appendiculate, spores small, as in the last. — Alp. regions r. *Amer.* Can. Brit. Col., Gold Range 2100 metr. a. s., Vanc. isl. (mt Benson): Macoun.

154. **Rhodobryum** (Schimper, as subgenus) Limpricht.

1.R.roseum Weis. — *Mnium* Weis; *Rhodobryum* Limpricht; *Bryum proliferum* (L. as var.) Sibthorp; Lindb.; Braithwaite.

Comal leaves suboblong or broadly lingulate, obtusate acute or abruptly broad-apiculate, serrate above middle, revolute below it; costa gradually narrower, not excurrent. Capsule red-brown subsymmetric nearly straight; neck short not or slightly curved; lid conic or subconvex mamillate; archegonia 5—6; pedicels often clustered. — Wet places in woods in lower districts. *Eur.* nearly common. Sweden, Switzerl.!

2.R.ontariense Kindb. — *Bryum* Kindb. bull. Torr. club XVI.

Comal leaves lingulate abruptly short-acuminate, much more numerous than in the last, dentate with large confluent often yellowish teeth above to $\frac{1}{4}$ or $\frac{1}{3}$, revolute below the dentate part; costa stout excurrent. Capsule pale brown asymmetric; neck curved half as long; lid convex short-apiculate; archegonia numerous; pedicel us. solitary. Dioecious as the last. — Old logs and limestone rocks. *Amer.* not r. Can.: Macoun; Moser. U. S.: Wetherby; Roell; Marshall A. Howe.

155. **Bryum** L.; Hedwig.

A. Perichetial leaves few, not much differing from the other upper ones. — Leaves gen. entire or faintly denticulate with few teeth, often limbate; upper cells us. rhomboidal; costa often excurrent.

2. Cilia of endostome mostly appendiculate. Spores small, about 0,01 m. m., r. nearly 0,02 m. m. Capsule r. oblique.

aa. Capsule thin-walled. Upper leaves setaceous; costa broad.

I. Leptobryum. Capsule with long downwards narrowed neck, very nitid (vernicoe). Leaves not limbate; cells sublinear. Stems not julaceous.

bb. Capsule thick-walled. Leaves not setaceous; costa narrow.
II. Eu-Bryum. Capsule with distinct, already before sporosis downwards narrowed neck. Leaves often limbate; costa often excurrent. Stems r. julaceous.

III. Pachylophus. Capsule with very short and thick, before sporosis not narrowed and often indistinct neck. Leaves not limbate, gen. reddish at insertion; costa not often excurrent. Stems mostly julaceous. Us. dioecious.

b. Cilia gen. smooth, r. appendiculate. Spores gen. large, about 0,03—0,04 m. m., r. smaller (about 0,02 m. m.) Capsule not r. oblique.

IV. Cladodium. Capsule gen. with distinct narrowed neck. Leaves mostly limbate; costa us. excurrent.

B. Perichetial leaves well-defined gen. numerous. — Leaves gen. denticulate with numerous teeth, r. (in *Epipterygium*) limbate; costa gen. not excurrent. Capsule narrowly necked, not oblique; cilia very r. (in *Webera*) appendiculate; spores gen. small.

a. Endostomial segments broad; cilia us. long.

V. Webera. Leaves not limbate, us. denticulate; cells us. narrow; costa sometimes short-excurrent.

VI. Epipterygium. Leaves broadly reddish limbate, entire, the larger us. dichous; cells dilated; costa abbreviate.

b. Endostomial segments somewhat narrow; cilia short or rudimentary.

VII. Pohlia*). Perichetial leaves sublinear-lanceolate narrowly acuminate acute. Leaves not limbate; upper cells gen. very narrow.

Eu-Bryum.

A. Basal leaf-cells not (or very pale) red. Capsule brown. Leaves gen. entire. Dioecious.

1. Julacea. Leaves crowded small green us. shining, gen. neither limbate nor reflexed; cells mostly very narrow; costa not or scarcely excurrent. Capsule not oblique. Stems julaceous. R. fruiting.

2. Speiophylla. Leaves more or less distant, often red, not shining, sometimes reflexed or limbate; cells dilated; costa sometimes excurrent. Capsule straight or (sometimes in *B. pallens*) oblique. Stems not julaceous.

B. Basal leaf-cells (at insertion of elder leaves) us. deep-red.

*) This section could be related as a proper genus to fam. *Meesaceae*, allied to *Plagiobryum* and *Orthodontium*.

5. Capsule gen. red, r. brown. Leaves broader at base, without hairpoint, r. limbate.

3. **Erythrocarpa.** Leaves often serrulate above; costa thin excurrent. Capsule mostly red. Tufts small us. loose. Dioecious or r. monoecious.

4. **Alpiniformia.** Leaves gen. entire; costa somewhat thick, gen. not (r. shortly) excurrent. Tufts large and dense. Us. dioecious.

b. Capsule brown or red-brown. Leaves gen. with a by costa not formed hairpoint, often entire; the lower of stem or the upper of shoots often broader above middle.

5. **Trichophora.** Leaves us. limbate; costa often abbreviate. Capsule gen. subclavate. Dioecious or r. synoecious. Tufts often large and dense.

c. Capsule brown. Leaves broader at base, without hairpoint, entire or denticulate; costa us. excurrent. Dioecious or sometimes synoecious.

6. **Bimiformia.** Leaves gen. broadly limbate and large, sometimes denticulate, often distant. Stem distinct us. high.

7. **Cæspiticia.** Leaves not or very narrowly limbate, gen. entire and not large, crowded. Stem distinct gen. not high.

8. **Gemmiformia.** Leaves not or narrowly limbate, small entire crowded. Stem very short with gemmiform shoots. Cilia of endostome sometimes not appendiculate.

Pachylophus.

A. Plants small with small leaves. Tufts low.

1. **Argenteiformia.** Capsule often red; neck finally narrowed. Costa of leaves subpercurrent or short-excurrent. Stems julaceous.

2. **Versicoloriformia.** Capsule us. (finally) red; neck us. not narrowed. Costa of leaves long-excurrent. Stems r. julaceous.

B. Plants large with large leaves.

3. **Zonatiformia.** Capsule yellowish; neck finally narrowed. Costa of leaves gen. subpercurrent. Stems not julaceous, us. very tomentose.

Cladodium.

A. Leaves not (or very faintly) red at insertion. Tufts mostly loose.

a. Capsule and peristomial teeth red. Leaves not limbate.

1. **Erythrodontia.** Capsule short-necked, not oblique. Monoecious.

b. Capsule and peristomial teeth brownish or yellowish. Leaves gen. limbate.

2. **Arcticiformia.** Capsule gen. not longer than neck, often oblique; teeth short; endostome more or less adhering. Us. synoecious. Leaves gen. entire.

3. **Ceraiiformia.** Capsule not longer than neck, us. oblique; teeth long; endostome gen. not adhering. Us. monoecious. Leaves us. denticulate above.

4. **Purpurascensiformia.** Capsule gen. longer than neck, not oblique. Often monoecious.

B. Leaves dark red at insertion (at least in elder leaves). Peristomial teeth brownish or yellowish.

a. Capsule red. Tufts loose.

5. **Calophylloidea.** Capsule very short-necked. Monoecious.

b. Capsule brownish or yellowish. Tufts gen. dense.

6. **Penduliformia.** Capsule gen. longer than neck, not oblique. Us. synoecious, r. dioecious or monoecious. Leaves gen. not decurrent.

7. **Rutilantiformia.** Capsule gen. not longer than neck, oblique. Us. dioecious, r. monoecious. Leaves decurrent distant.

Webera.

A. Perichetial leaves sublinear-lanceolate narrowly acuminate acute, longish. Other leaves r. decurrent.

1. **Crudiformia.** Capsule indistinctly necked before sporosis, finally not much longer than neck, often yellowish brown, gen. not pendent; pedicel long. Leaves often somewhat large; upper cells very narrow.

2. **Nutantiformia.** Capsule distinctly necked also before sporosis, not much longer than neck, brownish (or partly reddish) and somewhat narrow, pendent; cilia sometimes appendiculate. Leaves often distant; upper cells sometimes dilated.

3. **Pulchelliformia.** Capsule more or less distinctly necked before sporosis, gen. much longer than neck, often pendent and appressed to pedicel, sometimes reddish. Leaves small us. distant. Stem short. Dioecious.

B. Perichetial leaves shortish, oblong-lanceolate acute broadly acuminate or obtuse. Other leaves gen. decurrent; cells not r. dilated.

4. **Cucullatiformia.** Male flowers gemmiform. Capsule brownish annulate. Leaves green us. short.

5. **Albicantiformia.** Male flowers discoid. Capsule reddish not annulate. Leaves us. long, often glaucous green.

I. Leptobryum Br. eur.

1. **B. piriforme** L. — Mnium L.; Bryum Wiggers.

Capsule piriform or round-oval, chestnut-colored; neck long; lid small; annulus revoluble; teeth pale yellow; pedicel long. Tufts us. 1—2 c. m. high. Resembles somewhat *Dicranella heteromalla* in habit. — Stone-walls and rocks nearly common. *Eur.* Sweden etc. *Amer. Can.*: Macoun. U. S.: com. Cardot.

II. Eu-Bryum.

1. Julacea (Anomobryum Schimper).

A. Leaves obtusate obtuse, us. shining when dry.

2. **B. filiforme** Dickson. — Anomobryum julaceum Schimp.

Leaves ovate or ovate-oblong, very concave, gen. entire; upper cells narrow; costa not percurrent. Capsule suboblong. Stems longish, tufted. — Sandy soil in alps r. *Eur.* Switzerl. Austria: Schimper.

B. Leaves short-acuminate or apiculate (or some ones obtuse).

a. Leaves of the short fruiting stem reflexed, sublimbate, not shining; costa percurrent.

3. **B. bullatum** C. Mueller.

Leaves broad-ovate or ovate, entire; cells narrow. Capsule small oblong-piriform yellowish pendent; cilia appendiculate. Tufts loose; shoots and male plants longish. Habit of the last. — *Amer.* r. *Can.*, Selkirk mts: Macoun 1890. »Alaska»: C. M.

b. Leaves neither reflexed nor limbate, us. shining; costa subpercurrent or (in *B. juliforme*) abbreviate.

4. **B. juliforme** C. Solms Laubach. — Anomobryum Solms; Bryum Schimper.

Leaves ovate-oblong, denticulate near apex; upper cells narrow; costa short. Capsule claviform. Tufts about 1 c. m. high. — Rocks r. *Eur.* Italy: Bottini; Arcangeli. Norway: Hagen.

5. **B. sericeum** Lacroix. — *B. leptostomum* Schimp.

Leaves suboval entire: those of shoots often obtuse; upper cells oblong-lanceolate. Capsule suboblong; »peristome rudimentary»: Limpricht. Stem us. very low when barren, sometimes 1 c. m. high in fruiting state. — Wet rocks r. *Eur.* France: Berthoumieu; Lamy, com. Husnot.

6. **B. concinatum** Spruce.

Leaves ovate or broadly ovate-lanceolate, gen. entire; upper cells often rhomboidal. Capsules unknown. Stems longish, often mixed in other moss-tufts, sometimes with greenish bulbili. Often silver-glossy when dry. — Rocks princ. in alps r. *Eur.* Norway, Switzerl. »*Amer.*»: Lq. et Jam

7. B. Geheebii C. Mueller.

Leaves broad-ovate obtusely short-acuminate; upper cells rhombic. Capsules unknown. Stem with bulbilli. Tufts 3 c. m. high. Habit of the last. — Wet rocks r. *Eur.* Switzerland: Limpriht.

* **B. Combæ** Notaris.

Leaves ovate-oblong obtusely short-acuminate; upper cells oblong-oval or rhomboidal. Capsules unknown. Tufts 1 c. m. high. — *Eur.* r. Sardinia island: Comba: Limpriht.

2. *Speiophylla*.

A. Leaves finally rose-red, loosely disposed, gen. not limbate. Capsule not oblique, longer than neck.

a. Leaves long-decurrent; costa not excurrent.

8 B. Duvalii Voit. — *B. lato-decurrens* C. M. et Kindb. l. c.

Leaves not reflexed, ovate-oblong acute or apiculate. Capsule brown strangulate; pedicel often very long. Stems often long and loosely tufted. Not often fruiting. — Swamps also in alps. *Eur.* not uncommon. Norway! *Amer.* Can.: Macoun; Moser.

9. B. obtusifolium Lindberg.

Leaves reflexed, gen. broad-ovate obtuse, r. subacute. Ripe capsules not found; pedicel not long. Tufts us. dense and not high. — Northern alps near perennial snow r. *Eur.* Norway! Sweden: E. Nyman. Spetsbergen: Berggren; Gyllencreutz. *Amer.* Alaska: Palmer (fertile).

10. B. pygmaeo-alpinum C. M. et Kindb. l. c.

Leaves not reflexed, gen. broad-ovate obtuse, less loosely disposed. Capsules unknown. — Wet rocks in alp. region r. *Amer.* Can., Vanc. isl. 1700 metr. a. s.: Macoun.

b. Leaves gen. not decurrent; costa sometimes excurrent.

11. B. erythrophyllum Kindb. cat. Can. m.

Leaves (at least the lower) reflexed, subovate scarcely apiculate; cells subrhombic; costa percurrent. Capsule brown suboblong finally strangulate. Tufts loose. — Wet earth r. *Amer.* Can.: Macoun. Alaska: Palmer.

12. B. erythrophylloides Kindb. cat. Can. m.

Leaves diversiform, not reflexed: uppermost oblong-lanceolate somewhat long-acuminate with narrower cells and short-excurrent costa; middle leaves ovate-oblong acute with subrhombic cells and percurrent costa; the lowest ovate-oval subobtusate. Capsules unknown. Tufts loose. — By springs r. *Amer.* Can.: Macoun.

* **B. Gaspeanum** Kindb. l. c.

Nearly all leaves narrow: uppermost short-decurrent, lower sublimbate; costa sometimes long-excurrent. Capsules unknown. — Wet rocks r. *Amer. Can.*: Macoun.

13. **B. alpiniforme** Kindb. cat. *Can. m.*

Leaves not reflexed, ovate-oblong short-acuminate or apiculate; cells subrhombic; costa gen. short-excurrent. Capsules unknown. Tufts somewhat dense. — Rocks r. *Amer. Can.*: Macoun.

B. Leaves us. red, gen. not much distant, limbate; costa percurrent or short-excurrent; shoot-leaves us. decurrent. Capsule shorter than neck, not or indistinctly constricted below mouth, often oblique.

14. **B. pallens** Swartz.

Leaves us. reflexed to above middle, ovate-oblong or subobovate, acute or acuminate, entire or nearly so, brownish or yellow limbate, somewhat twisted when dry. Capsule us. oblique with often curved neck; teeth yellow; endostome nearly orange; lid mamillate; cilia sometimes not appendiculate; spores r. large. Stem us. low (about 1 c. m.) and sparingly radiculose near base. Tufts loose. Easily confounded with *B. arcticum*. — Moist earth, sometimes on stone-walls, often in alps. *Eur.* common. Sweden, Norway, Switzerl. *Amer. r. Can.*: Macoun.

* **B. rufescens** Kindb. n. subsp.

Leaves very distant, entire, faintly or not reflexed, spreading when dry. Tufts dense rufescent 6—8 c. m. high. Capsules unknown. — Alp. districts r. *Eur. Norway*, near Kongswood!

* **B. fallax** Milde.

Leaves scarcely reflexed, oval-ovate narrowly limbate us. not red; costa gen. percurrent. Capsule us. not oblique; lid apiculate; cilia not appendiculate. Tufts low less loose. — Wet rocks princ. in higher alp. region r. *Eur. Norway*! France: Boulay. *Amer. Alaska*: J. M. Macoun.

* **B. baldense** Venturi.

• Capsule symmetric; cilia not appendiculate. Costa of leaves gen. abbreviate. — Calcareous alp. rocks r. *Eur. Austria*: Vent.

C. Leaves us. greenish, more or less loosely disposed. Capsule strangulate, not oblique.

a. Leaves obtuse; costa abbreviate.

15. **B. cyclophyllum** Schwægrichen. — *Mnium* Schw.; *Bryum* B. E.

Leaves not distinctly limbate, round-oval or broadly obovate, loosely disposed, not distinctly decurrent, not or scarcely reflexed. Capsule brown-yellow; neck short. Stems not or loosely

tufted, often long. Very r. fruiting. — Wet places princ. below alps r. *Eur.* Sweden: R. Hartman. Finl: Brotherus. France: Boulay. *Amer.* Can.: Macoun. Greenl.: Berggren.

b. Leaves gen. acute (in *B. Schleicheri* **latifolium* mostly obtuse); costa percurrent or short-excurrent. R. fruiting. Male flowers subdisciform.

16. *B. turbinatum* Hedwig.

Leaves indistinctly or very narrowly limbate, not imbricate when dry, carinate; upper cells rhomboidal. Stem-leaves ovate-lanceolate, reflexed below, gen. not decurrent. Capsule long-necked; teeth yellow, segments paler; lid apiculate. Tufts us. tomentose, often high. — Wet places also in alps. *Eur.* not common. Sweden, Norway, Switzerl.! France: Schimper. England: Rogers. *Amer.* r. Can.: Macoun.

17. *B. Schleicheri* Schwægrichen.

Differs from the last: Leaves shorter, ovate-oblong concave, gen. broadly limbate and decurrent; upper cells often subrhombic. Capsule larger, short-necked; segments nearly orange; lid conic. Tufts sparingly radiculose. — Wet places in alp. region princ. in southern districts. *Eur.* Switzerl., Norway! Austria: Bredler. *Amer.* r. Can.: Macoun.

* *B. latifolium* Schleicher. — Mnium Schl.; Bryum Bridel.

Leaves larger, subovate gen. obtuse, often partly reddish. — In higher alp. region r. *Eur.* Switzerl.! Austria: Venturi. Greece: Heldreich. France: Husnot. Scotl.: Holt.

18. *B. grandirete* Kindb. n. sp.

Leaves acute not limbate, imbricate when dry, ovate or broad-ovate, not or scarcely acuminate, loosely disposed and short-decurrent; cells very large: upper subrhombic; costa percurrent. Capsules unknown. Tufts sparingly radiculose, red-brown below, yellowish green above, not high. — In alps r. *Amer.* Can. Brit. Col.: Macoun.

3. *Erythrocarpa*.

A. Leaves not limbate.

a. Capsule strangulate turbinate. Dioecious.

19. *B. Klinggræffii* Schimper. — »*B. constrictum* Bruch mscr.» Husnot.

Leaves small entire, reflexed below: uppermost ovate-lanceolate; costa percurrent or short-excurrent. Tufts loose green. — Earth and stone-walls r. *Eur.* Switzerl.! Germany: Milde. Sweden: Groenwall.

b. Capsule not strangulate.

aa. Capsule thick short-piriform. Monoecious.

20. **B. Sauteri** Bryol. eur.

Leaves entire narrowly ovate-oblong not reflexed; costa long-excurrent. Tufts reddish green or brownish. — Wet sand by alp. rivulets r. *Eur.* Austria: Gander.

bb. Capsule gen. narrow. Dioecious

21. **B. erythrocarpum** Schwægrichen.

Leaves narrow serrulate above, reflexed below middle, often decurrent; the uppermost with excurrent costa. Tufts yellowish green. Often with red bud-like propagula. — Sandy places princ. below alps. *Eur.* not uncommon. Sweden, Switzerl.! *Amer.* »U. S.»: Lesq. et Jam.

22. **B. murale** Wilson.

Leaves ovate-oblong not reflexed gen. entire, not decurrent; costa excurrent. Tufts yellowish green, or reddish below. — Stone-walls and rocks in lower distr. r. *Eur.* Switzerl.! Greece: Heldreich. France: Le Jolis.

B. Leaves limbate. Capsule not strangulate. Dioecious.

a. Leaves serrulate above. Capsule narrow.

23. **B. marginatum** Bryol. eur.; Husnot m. gall.

Leaves ovate-oblong not reflexed; costa subpercurrent. Tufts dense brown-red. — Sandstone rocks r. *Eur.* »Germany: Bruch»: Schimper.

24. **B. Bomanssonii** Lindberg.

Leaves ovate-lanceolate reflexed below; costa long-excurrent. Tufts brown loose. — *Eur.* r. Finl.: Bomansson, com. Brotherus.

b. Leaves nearly entire, not distinctly reflexed. Capsule sometimes thick.

25. **B. rubens** Mitten; Braithwaite brit. mossfl.

Leaves ovate-oval; costa excurrent. Capsule narrow; lid apiculate. Tufts somewhat loose yellowish green, or reddish below. — On ground r. *Eur.* »Engl.»: Braithwaite.

26. **B. micro-erythrocarpum** C. M. et Kindb. l. c.

Leaves ovate-oblong; costa gen. subpercurrent. Capsule thick piriform; lid rostellate. Tufts dense finally rufescent. — Wet gravel near water. *Amer.* Can. Vanc. isl.: Macoun.

4. Alpiniformia.

A. Leaves distinctly limbate (at least the lower) and reflexed; costa gen. percurrent.

a. Leaves obtusate subobtuse; the lower broadly recurved and limbate; the uppermost not limbate and nearly flat. Capsules unknown.

27. B. percurrentinerve Kindb. bull. Torr. club XVII.

Leaves somewhat large, not distinctly decurrent, nearly appressed when dry; upper cells oblong-oval. Lower leaves subovate finally red; uppermost green glomerate oval or oval-oblong. Tufts about 2 c. m. high. — Dripping rocks near a waterfall r. *Amer. Can. Brit. Col.: Macoun.*

b. Leaves (at least the upper) acute, all narrowly reflexed and limbate.

aa. Leaf-cells red also those of the limb.

28. B. hæmatophyllum Kindb. cat. Canad. m.

Leaves very small, scarcely twisted; upper cells subrhombic. Lower leaves oval-ovate subobtusate; uppermost suboblong acute with short-excurrent costa. Capsule (unripe) small oblong-obovate; lid convex short-apiculate; pedicel thin short. Tufts about 1 c. m. high. — Wet rocks r. *Amer. Can. Rocky mts and Anticosti: Macoun.*

29. B. anoëtangiaceum C. M. et Kindb. l. c.

Differs from the last: Nearly all leaves acute more distinctly acuminate, less distinctly reflexed and limbate, less crowded and spirally twisted when dry. Capsules unknown. Tufts scarcely 2 c. m. high. — Rocks by torrents r. *Amer. Can. Brit. Col.: Macoun.*

bb. Leaf-cells not red.

30. B. hæmatocarpum C. M. et Kindb. l. c.

Leaves ovate-oblong acuminate, slightly corrugate and not or loosely appressed when dry: those of branches distant decurrent. Capsule blood-red not constricted; endostome orange; segments short; cilia often indistinctly appendiculate; pedicel 2—5 c. m. long. Tufts tomentose about 5 c. m. high. — Damp rocks r. *Amer. Can. Brit. Col.: Macoun.*

B. Leaves not or indistinctly limbate.

a. Leaves gen. broadly recurved all around or to above middle, not decurrent; costa us. red.

aa. Costa of leaves gen. excurrent.

31. B. aciculinum Kindb. n. sp.

Leaves oblong-lanceolate acute recurved nearly all around, nearly appressed when dry; upper cells oblong-rhomboidal, lower basal near costa deep-red numerous. Capsule brown; teeth pale. — In alp. region r. *Amer. Can. Brit. Col. 1250 metr. a. sea: Macoun.*

bb. Costa of leaves gen. percurrent.

32. **B. alpinum** Hudson.

Leaves nearly appressed not twisted when dry, us. ovate-oblong or ovate-lanceolate acute and recurved to above middle; upper cells us. narrow. Capsule blood-red not or faintly constricted. Tufts often copper glossy. — Wet rocks. *Eur.* not uncommon. Sweden, Norway, Switzerl. *Amer. r.* »U. S. White mts»: James.

* **B. meridionale** Schimper.

Leaves narrower with narrow cells; the uppermost often with short-excurrent costa. — *Eur.* southern distr. *r.* Spain, Portugal: Levier.

* **B. appressum** Kindb. in Hedwigia 1896 p. 66.

Capsule brown. Leaves narrow, lanceolate short-acuminate acute or obtuse, recurved all around, more strongly appressed when dry, gen. not red at base; costa not red. Tufts sparingly radiculose not glossy. — *Amer. r.* U. S. Washington: Roell.

* **B. gemmiparum** Notaris.

Leaves us. green and not glossy, sublimbate by one row of narrower cells, less recurved and less appressed, gen. subobtusate; uppermost often denticulate near apex; costa not red. Capsule red-brown. Very *r.* fruiting. — Wet rocks *r.* *Eur.* Switzerl. Italy: Bottini. Belgium: Delogne.

33. **B. Muehlenbeckii** Br. *eur.* — *B. alpinum* var. *brevifolium* Myrir; *B. brevifolium* Lindb.; *B. rubicundulum* C. M. et Kindb. l. c.

Differs from *B. alpinum*: Leaves gen. suboblong obtusate or obtuse, often recurved nearly all around; upper cells more dilated. Capsule sometimes brown (but often blood-red). Tufts not glossy. — Dripping rocks. *Eur.* less *r.* Norway! Sweden: Arnell; P. Olsson. Switzerl.: Culmann. *Amer. r.* Can.: Macoun; Waghorne.

34. **B. Rauli** Austin.

Leaves very much twisted when dry, subovate broadly obtusate subobtusate, strongly recurved all around; cells subrhombic, the lowest near base deep-red numerous; costa *r.* but shortly excurrent. Capsule pale brown subclavate strangulate; neck longer. Tufts very tomentose, green above, not glossy. — Wet rocks *r.* *Amer.* Can. Pacif. distr.: Macoun Canad. musci n. 480.

b. Leaves not or slightly reflexed.

aa. Leaves small and green, more or less twisted when dry.

35. **B. flagellosum** Kindb. n. sp.

Leaves gen. ovate; cells subrhombic; costa sometimes short-excurrent. Uppermost leaves and those of flagelliform shoots

ovate-oblong. Capsule brown oblong-piriform faintly constricted, smaller and shorter than in the last; neck short. Tufts dense tomentose. Habit of *B. caespitium*. — Amer. r. Can. Rocky mts: Macoun.

bb. Leaves not twisted, more or less strongly appressed when dry, large and mostly reddish.

36. B. Mildel Juratzka.

Leaves gen. ovate-oblong acute sometimes denticulate near apex; cells oblong-rhomboidal; costa green or brown-yellow not r. short-excurrent. Capsule reddish yellow finally brown. Tufts green us. silky or golden glossy, often very large. Very r. fruiting. — Earth and stones r. *Eur.* Switzerl; Philibert. Belgium: Roemer.

37. B. Atwateriæ C. Mueller.

Leaves gen. arrounded at apex, not r. short-decurrent; lower cells red; costa not excurrent, finally crimson-red. Stem-leaves suboblong; cells oblong-lanceolate. Branch-leaves crimson-red gen. suboval with oblong-oval cells, sometimes narrower with narrower cells. Capsule us. red, not strangulate. Tufts 3—5 c. m. high, us. red not glossy. — Wet rocks r. *Amer.* princ. in Pacif. distr.: Macoun. U. S.: Henderson, com. Cardot.

38. B. miniatum Lesquereux.

Differs from the last: Leaves not decurrent, often green or brown; cells suboblong; costa green or at base red. Capsule smaller. — Wet rocks r. *Amer.* Can. Brit. Col. 1300 metr. a. sea; N. Foundl.: Waghorne.

39. B. capitellatum C. M. et Kindb. l. c.

Uppermost leaves suboblong subacute not arrounded at apex; cells somewhat narrow; costa green percurrent. Lowest leaves small oval round-obtuse distant finally reddish; costa red not percurrent. Tufts low golden glossy above or green. Capsules unknown. — Wet rocks near Pacific sea r. *Amer.* Can. Vanc. isl.: Macoun.

40. B. corsicum Kindb. n. sp. in litt. ad Levier.

Leaves flaccid pale red entire subobtuse, not distinctly reflexed, not densely appressed when dry; upper cells wide, the others somewhat narrow; costa pale red or yellowish not excurrent. Stem-leaves crowded ovate-oblong; branch-leaves suboblong distant decurrent. Capsules unknown. Tufts high. — *Eur.* r. Corsica; E. Levier.

5. Trichophora.

A. Leaves distinctly limbate.

a. Leaves, princ. the lower of stem, gen. sublingulate with long narrow base, us. obtusate; basal short-rectangular, upper rhomboidal. Us. dioecious.

41. **B. capillare** L.

Leaves gen. broad-limbate nearly entire and crowded, twisted when dry, us. green; limb us. yellowish. Capsule us. red-brown. — On dry stones and old roofs princ. in lower districts. *Eur.* common. Sweden, Germany, Switzerl. *Amer.* »U. S.«: Lesq. et Jam.

* **B. torquescens** Bruch.

Leaves dark-green or brownish, more acuminate. Capsule dark brown. Sometimes synoecious or monoecious. — *Eur.* r. Germany, Switzerl. France: Philibert. Engl: Holt. Greece: Orphanides. »*Amer.*«: Lesq. et Jam.

* **B. restitutum** Notaris.

Leaves finally brown-red, entire obtuse; limb brown. Capsule dark brown. — *Eur.* r. Switzerl. near Luganol »Italy near Como«: Notaris.

* **B. ruraliforme** Kindb. n. subsp.

Leaves brown-red strongly dentate subacute; limb brown. Shoot-leaves sometimes decurrent. Capsules unknown. Habit of *Barbula ruralis*. — *Amer.* r. Can. Vanc. isl.: Macoun 1893.

* **B. erythroloma** Kindb. n. subsp.

Leaves purplish red acute nearly entire; limb rose-red. — *Amer.* r. Can. Vanc. isl.: Macoun 1892.

* **B. Haistii** Schimper.

»Leaves small entire finally red; awn reddish. — Stone-walls r. *Eur.* Switzerl.«: Schimper.

42. **B. speirophyllum** Kindb. bull. soc. bot. ital. 1895.

Differs from *B. capillare*: Leaves narrowly limbate distant decurrent gen. entire, flaccid when moist, corrugate not twisted when dry. — Moist rocks. *Eur.* Sweden, Switzerl. *Amer.* Can. Vanc. isl.: Macoun.

b. Leaves, princ. those of stem, subovate-lanceolate with not or slightly narrowed base, often acuminate, not or slightly twisted when dry; basal cells short-rectangular, upper rhomboidal. Dioecious.

43. **B. Donli** Greville.

Leaves nearly crowded and not decurrent, us. denticulate and broadly limbate. Upper shoot-leaves often rosulate. Capsule often very large. Tufts green or brown. — Dry stones in warmer distr. r. *Eur.* Italy: Levier; Arcangeli. Greece:

Heldreich. France: Corbière. *Amer.* Pacif. distr. Can.: Macoun. U. S.: Marshall A. Howe; Roell.

* **B. obconicum** Hornschuch.

Leaves nearly entire not rosulate. Capsule less large. — Walls and sandstone rocks r. *Eur.* Switzerl. Engl.: Curnow, com. Holt. *Amer.* Can. Pacif. distr.: Macoun.

* **B. floridanum** Renauld et Cardot.

»Leaves shorter, narrower limbate not recurved. — *Amer.* r. U. S.: Cardot.

44. **B. squarrosus** Kindb. in Hedwigia 1896 p. 66.

Fruiting stem very short; leaves crowded denticulate, less distinctly limbate. Leaves of sterile stems (shoots) broadly limbate gen. denticulate, distant decurrent spreading also when dry. Capsule not large. Tufts reddish brown. — *Amer.* r. U. S. Oregon near Astoria: Roell.

c. Leaves short narrowly limbate. Tufts low and dense. Dioecious.

aa. Leaves imbricate somewhat large, very concave.

45. **B. elegans** Esenbeck.

Leaves subobovate not or indistinctly recurved, only the upper limbate denticulate; cells subrhombic. Capsule large. Tufts green or finally reddish. — Calcareous rocks princ. in alps r. *Eur.* Switzerl. in alp. region!

b. Leaves small us. not imbricate; cells gen. oblong-rhombic.

46. **B. oreganum** Sullivant; Lesq. et Jam.

Leaves twisted: lower few very small; upper glomerate subovate abruptly acuminate, sometimes recurved. Tufts brown or finally reddish, very low. — *Amer.* r. Can. Brit. Col.: Macoun.

47. **B. streptophyllum** Kindb. n. sp.

Differs from the last: All leaves crowded nearly uniform: upper not larger and not recurved, very concave. Tufts green finally brown, less low. Capsules unknown. — *Amer.* r. Can. Brit. Col.: Macoun.

48. **B. trichophorum** Kindb. n. sp.

Leaves obtusate appressed neither recurved nor twisted: lower distant linear-oblong acute, upper crowded suboval. Tufts green. Capsules unknown. — *Amer.* r. Can. Vanc. isl. near sea: Macoun 1893.

B. Leaves not distinctly limbate.

a. Leaves, princ. the lower of stem, gen. sublingulate with long narrow base, as in *B. capillare*, us. twisted and crowded. Dioecious.

aa. Leaves not decurrent; cells large.

49. *B. Hendersoni* Renauld et Cardot.

Leaves large strongly dentate and recurved, twisted; awn short often dentate; upper shoot-leaves rosulate. Capsule large. Tufts green somewhat high. — Rocks r. *Amer.* Pacif. distr. Can. Vanc. isl. Macoun 1887 and 1893. U. S. Oregon: Henderson, com. Cardot.

50. *B. Sawyeri* Renauld et Cardot.

Leaves less large nearly entire not recurved, twisted. Capsule less large. Tufts green. — Logs and rocks r. *Amer.* Can.: Macoun. U. S.: Sawyer, com. Cardot.

51. *B. sanguilentum* Renauld et Cardot.

Leaves not large, recurved and nearly entire, not twisted. Capsule red not large. — Logs r. *Amer.* U. S. Calif.: M. A. Howe.

bb. Leaves decurrent; cells somewhat small.

52. *B. gemmascens* Kindb. n. sp.

Leaves small twisted entire not recurved: lower and middle distant short-decurrent narrowly sublingulate acuminate acute; comal leaves glomerate to a broadly clavate bud, suboval subobtuse. Tufts green. Capsules unknown. — Stones near sea. *Amer.* Can. Vanc. isl.: Macoun 1893.

b. Leaves, princ. those of stem, subovate-lanceolate, as in *B. Donii*.

53. *B. provinciale* Philibert.

Leaves crowded scarcely or not twisted, us. denticulate. Capsule often less large than in *B. capillare*. Tufts dense us. brown. Sometimes synoecious. — Calcareous soil r. *Eur.* France: Philibert. Greece: Heldreich.

*** *B. crassirameum* Renauld et Cardot.**

Leaves green entire more recurved. Tufts loose. — *Amer.* r. U. S.: Henderson, com. Cardot.

54. *B. extenuatum* Renauld et Cardot.

Leaves distant nearly entire gen. long-decurrent, twisted when dry. Tufts green not dense. — Logs and rocks r. *Amer.* Pacif. distr. Can.: Macoun. U. S.: Henderson, com. Cardot.

c. Leaves short as in *B. elegans*, not recurved; cells subrhombic. Dioecious.

aa. Leaves twisted when dry, not densely crowded. Capsules unknown.

55. *B. Stirtoni* Schimper; Braithwaite.

Leaves broadly subovate nearly entire subdecurrent not large. Tufts green. — *Eur.* r. Switzerl.! »Scotl.»: Braithw.

56. *B. tomentosum* Kindb. n. sp.

Leaves subovate nearly gradually acuminate, entire decurrent small. Tufts brown and very tomentose below, green above, dense and not low. — *Amer.* r. Can. Rocky mts: Macoun 1890.

bb. Leaves not distinctly twisted, nearly appressed when dry.

57. *B. heteroneuron* C. M. et Kindb. cat. Can. m.

Leaves suboval or subobovate often obtuse, entire or faintly denticulate, crowded and not large; awn sometimes wanting. Capsule less large than in *B. capillare*. Tufts us. reddish, not high; shoots clavate. — Rocks and roadsides r. *Amer.* Can. Brit. Col. and Vanc. isl.: Macoun.

58. *B. carinthiacum* Bryol. eu.

Leaves subobtuse cochleariform gen. not large: lower entire subobovate not crowded, upper ovate-oval us. denticulate. Tufts brown with green tops us. very high. Capsules not seen. — Moist rocks princ. in alps r. *Eur.* Switzerl.! Austria: Breidler, com. Warnstorf.

*** *B. spelugense*** Kindb. n. subsp.

Leaves larger, flaccid and not cochleariform: upper subobovate, middle short-decurrent; cells larger; awn sometimes indistinct. Capsules unknown. — Rocks in higher alp. region r. *Eur.* Switzerl. near Spluegen 1500 metr. a seal

59. *B. Ferchellii* Funck.

Leaves small suboval-ovate subobtuse entire or faintly denticulate, gen. crowded and not decurrent; awn us. short. Capsule smaller than in *B. elegans*; lid mamminate. Tufts brown-green us. low. — Rocks princ. in alps, r. *Eur.* Norway, Switzerl.! *Amer.* »U. S.«: Cardot.

*** *B. suecicum*** Kindb. n. subsp.

Leaves gen. distant decurrent entire; awn long flexuous. Capsules not seen. Tufts brown below, dark green above, about 4 c. m. high. — Moist places r. *Eur.* Sweden Aongermanl. on the shore of a lake: H. W. Arnell.

6. Bimiformia.

A. Leaves distinctly decurrent, not (or slightly near base) reflexed, gen. broadly limbate; costa gen. percurrent. Dioecious.

60. *B. neodamense* Itzigsohn.

Leaves suboblong obtusate us. obtuse cucullate. Tufts us. brown-green. R. fruiting. — Swamps and rivulets. *Eur.* not common. Norway! Sweden: Lindberg. Spetsbergen: Berggren. Engl.: Rogers. Spain: Husnot.

* **B. ovatum** Juratzka.

Leaves oval-ovate more concave and large; the uppermost acuminate. Tufts green us. high. — *Eur.* r. Norway! Austria: Breidler. Finl.: Brotherus.

61. **B. denticulatum** Kindb. bull. Torr. club XVII.

Leaves oblong-lanceolate acuminate acute, distantly denticulate above to middle. Capsules unknown. — Springs and bogs r. *Amer.* Can. Cypress hills: Macoun.

62. **B. hydrophilum** Kindb. bull. Torr. club XVII.

Leaves narrowly ovate-lanceolate acuminate acute nearly entire. Capsules unknown. — Wet springy places r. *Amer.* Can. Vanc. isl.: Macoun.

B. Leaves decurrent, recurved nearly all around, acuminate acute.

a. Costa of leaves long-excurrent. Capsule narrow stragulate; neck us. long; teeth yellow; segments fenestrate.

63. **B. affine** Bruch. — Webera Bruch; Bryum Lindb.; *B. cuspidatum* Schimper.

Leaves gen. ovate-lanceolate and not broadly yellowish limbate, denticulate near apex, short-decurrent not or slightly twisted. Peristomial teeth pale. Stem not high. Pedicel not long. Habit of *B. pallescens*. Synoecious. — Stonewalls and rocks r. *Eur.* Norway! France: Renauld. Sweden: Grönwall. Spain near Valencia: Dieck, com. Roell.

64. **B. rezelstokense** Kindb. revue bryol. 1896.

Leaves ovate-lanceolate long-acuminate entire with pale not broad limb, much twisted when dry, short-decurrent exc. the uppermost glomerate. Pedicel very long. Tufts green tomentose 1—2 c. m. high. Dioecious. — Wet rocks r. *Amer.* Can. Brit. Col.: Macoun.

b. Costa of leaves not or shortly excurrent. Tufts us. high and tomentose, sometimes red.

65. **B. bimum** Schreber.

Leaves gen. ovate-oblong and denticulate near apex; limb broad yellowish. Perichetial leaves with not excurrent costa. Capsule brown not oblique; neck shorter; teeth pale. Synoecious. — Swamps and wet rocks not uncommon. *Eur.* Sweden, Norway, Switzerl. *Amer.* Can.: Macoun. U. S.: Schrader, com. C. M.

66. **B. leucolomatum** C. M. et Kindb. cat. Can. m.

Leaves as in the last; limb pale. Perichetial leaves with excurrent costa. Capsule as in the last. Stem very high. Synoecious. — Marshes r. *Amer.* Can. Brit. Col.: Macoun.

67. **B. ventricosum** Dickson. — *B. pseudotriquetrum* Schwægr.

Leaves as in *B. bimum*. Capsule brown sometimes slightly oblique; neck often long; teeth yellow. Dioecious. Very variable. — Wet places common also in alps. *Eur.* Sweden etc.! *Amer.* Can.: Macoun.

* **B. bimoideum** Notaris. — »Leaves nearly imbricate suberect; costa longer-excurrent. Lid of capsule long-apiculate. — *Eur.* r. Switzerl.»: Limpricht.

* **B. hyalodontium** C. M. et Kindb. l. c.

Capsule pale brown not oblique; teeth pale hyaline. — Wet rocks r. *Amer.* Can. Brit. Col.: Macoun.

68. **B. Reyeri** Breidler.

Differs from *B. ventricosum*: »Leaves longer finally reddish, narrowly limbate and nearly entire. Capsules unknown. — Dripping alp. rocks r. *Eur.* Austria: Breidler»: Limpricht.

C. Leaves not decurrent, broadly limbate and recurved gen. entire; costa excurrent.

a. Capsule strangulate with wide mouth. Tufts dense.

69. **B. pallescens** Schleicher.

Leaves gen. ovate-lanceolate, twisted when dry. Capsule pale brown or yellowish us. subclavate and not pendent when young; teeth pale. Tufts us. 2—3 c. m. high, often green. Often monoecious. — Earth and rocks also in alps, princ. the northern. *Eur.* not uncommon. Sweden, Norway, Switzerl.! *Amer.* Greenl.: Berggren. Can.: Macoun.

* **B. contextum** Hoppe et Hornschuch.

Leaves short-acuminate smaller. Capsule thicker and more distinctly strangulate; pedicel often only 1 c. m. long. Tufts brown-green often much higher. — Rocks princ. in alps. *Eur.* Norway!

70. **B. cirratum** Hoppe et Hornschuch.

Leaves gen. ovate or ovate-oblong, not or slightly curled. Capsule brown somewhat thick and pendent; teeth pale. Tufts green us. about 1 c. m. high and less compact than in the last. Spores in some alpine forms somewhat large. Us. synoecious. — On earth princ. on old roads in alps. *Eur.* not r. Norway, Switzerl.! *Amer.* r. Can.: Macoun.

* **B. sysphinctum** Limpricht.

Leaves denticulate near apex; costa short-excurrent. Capsule smaller thicker and more constricted with shorter neck. Sometimes monoecious. — In alps r. *Eur.* Norway!; Kaurin.

b. Capsule small-mouthed not constricted.

71. *B. subglobosum* Schliephacke.

»Leaves ovate-oblong not twisted; costa long-excurrent. Capsule subglobose-piriform; neck short; lid mamillate; teeth brown-yellow. Tufts dusky green less than 1 c. m. high. Synoecious or polygamous. — Alp. rocks r. *Eur.* Switzerl.: Gräf»: Limpricht.

* ***B. Bænitzi*** C. Mueller.

Capsule oval-oblong finally piriform. Uppermost leaves sublanceolate. Tufts about 1 c. m. high. — Arctic distr. r. *Eur.* Norway: Pænitzi, com. E. Adlerz.

72. *B. Lisæ* Notaris.

»Leaves oblong-lanceolate appressed when dry; costa long-excurrent. Capsule ovoid; neck scarcely shorter; lid mamillate; teeth brown-yellow. Tufts brownish loose about 1 c. m. high. Synoecious. — On mountains r. *Eur.* Italy: Lisa»: Limpricht.

7. *Cæspiticia*.

A. Leaves distinctly limbate. Spores about or nearly 0,02 m. m.

a. Fertile stem nearly indistinct with glomerate leaves. Sterile shoots elongate julaceous. Dioecious.

73. *B. Jackii* C. Mueller.

»Leaves ovate-lanceolate acuminate, denticulate near apex, strongly recurved; costa long-excurrent. Capsule oval or subcylindric; lid blackish red. Tufts dense 3 c. m. high. — Alp. region r. *Eur.* Austria: Jack»: Limpricht.

b. Stem us. distinct; shoots not julaceous. Synoecious.

74. *B. stenotrichum* C. Mueller.

»Leaves small from broad-ovate base somewhat long-acuminate reflexed to acumen; costa long-excurrent. Capsule small suboblong; neck short; teeth short; cilia rudimentary; pedicel about 3 c. m. long. Tufts low. Fertile stem short with somewhat short shoots. Habit of *B. cæspitium*. — Arctic distr. r. *Amer.* Alaska: Krause»: C. M. in Flora 1887.

75. *B. producticolle* Kindb. n. sp.

Leaves ovate-lanceolate reflexed; costa long-excurrent. Capsule narrow strangulate; neck long not curved; lid low short-apiculate; cilia long-appendiculate. Tufts about 1 c. m. high. Spores scarcely 0,02 m. m. — Rocks r. *Amer.* Can. Vanc. isl.: Macoun 1893.

76. *B. manilligerum* Kindb. cat. Canad. m.

Leaves narrowly ovate-oblong not distinctly reflexed; costa long-excurrent. Capsule narrow not strangulate; neck long cur-

ved; lid low mamillate. Tufts 1—2 c. m. high. Fruiting stem 1—2 m. m. high. Spores larger than in the last. — Damp rocks r. *Amer.* Can. Rocky mts: Macoun.

77. *B. fuscum* Lindberg.

»Leaves ovate-lanceolate reflexed, denticulate above; costa short-excurrent. Capsule narrow faintly constricted; neck as long; lid short-conic; cilia long-appendiculate. Tufts about 1 c. m. high. Spores about 0,02 m. m. — Wet sand r. *Eur.* Finl.: Lindberg»: Limpricht.

B. Leaves not distinctly limbate.

a. Shoots julaceous. Leaves not or near base slightly reflexed. Dioecious.

78. *B. Funckii* Schwægrichen.

Leaves subovate very short-acuminate; upper cells dilated; costa short-excurrent. Capsule narrow strangulate; lid mamillate. Tufts loose very low. Spores sometimes about 0,02 m. m., often smaller. — Sand or gravel princ. in southern distr. *Eur.* not r. Sweden: R. Hartman; J. Persson.

79. *B. Kunzei* Hornschuch.

Leaves smaller nearly pellucid: those of stem suboblong; shoot-leaves broad-ovate longer acuminate; upper cells narrow; costa long-excurrent. Capsule narrow or subpiriform strangulate; lid mamillate. Tufts compact about 2 c. m. or higher. Spores about 0,01 m. m. — Dry earth also in alps r. *Eur.* Norway!

80. *B. occidentale* Sullivant.

Leaves small oval or suboblong often decurrent; upper cells narrow; costa short-excurrent. Capsule oblong wide-mouthed; lid apiculate. Tufts tomentose about 1 c. m. high. — *Amer.* r. U. S. Montana: Roell.

b. Shoots not distinctly julaceous. Spores small about 0,01 m. m. Usually dioecious. Capsule us. narrow.

81. *B. caespitium* L.

Leaves narrowly ovate-oblong or shorter, us. recurved all around; costa us. long-excurrent. Capsule strangulate us. yellowish brown; lid us. mamillate. Tufts about 2 c. m. high or lower. — Earth and rocks common. *Eur.* Sweden, Norway, Switzerland *Amer.* Can.: Macoun. U. S.: Schrader, com. C. M.

*** *B. badium* Bruch.**

Capsule reddish brown; lid apiculate. Leaves sublimbate. Tufts loose. — Humid earth r. *Eur.* Austria: Breidler. Switzerland: Pfeffer, com. Arnell.

* **B. comense** Schimper.

Leaves somewhat small, often slightly reflexed. Shoots sometimes subjulaceous. — Earth and walls r. *Eur.* Switzerl.; Philibert.

* **B. oligochloron** C. M. et Kindb. l. c.

Leaves not or indistinctly reflexed, erect when moist. Shoots subjulaceous. Capsules unknown. — Rocks r. *Amer.* Can. Brit. Col.: Macoun.

* **B. pseudo-Kunzei** Limpricht.

»Leaves ovate-oblong gen. not recurved; costa short-excurrent. Tufts about 1 c. m. high. Synoecious. — In alp. region r. *Eur.* Switzerl.: Culmann»: Limpricht.

82. **B. microcephalum** C. M. et Kindb. l. c.

Differs from *B. caespitium*: Leaves narrower, lanceolate very long-acuminate; cells longer very narrow. Stem long proliferous with numerous small male buds. Capsules unknown. — Rocks r. *Amer.* Can. Brit. Col.: Macoun.

83. **B. vancouveriense** Kindb. bull. Torr. club XVI.

Leaves narrowly ovate-oblong reflexed below; cells smaller than in *B. caespitium*; costa denticulate above, sometimes short-excurrent. Capsule pale brown not constricted; lid low mamillate; pedicel about 5—6 c. m. long. Fruiting stem very short. — Wet earth in woods r. *Amer.* Can. Vanc. isl.: Macoun.

c. Shoots not julaceous. Spores about 0,02 m. m. Us. synoecious. Capsule us. not strangulate (exc. *B. Culmannii*).

aa. Capsule narrow.

84. **B. intermedium** Ludwig. — Mnium Ludw.; Bryum Bridel.

Capsule not strangulate; neck us. long often curved; lid acute; cilia short-appendiculate. Leaves reflexed narrowly ovate-oblong. Tufts green 1—2 c. m. high. — On earth princ. below alps. *Eur.* not r. Sweden, Norway, Switzerl. France: Boulay. *Amer.* Can.: Macoun.

85. **B. clathratum** Amann; Limpricht.

»Capsule not strangulate; neck shorter often curved; lid low mamillate; cilia long-appendiculate. Leaves oval-oblong strongly recurved all around. Tufts brown-green about 1 c. m. high. — Wet places in alp. region r. *Eur.* Switzerl.: Amann»: Limpricht.

86. **B. Culmannii** Limpricht.

»Capsule strangulate longer than the not curved neck; lid acute; cilia long-appendiculate. Leaves subovate, the upper recurved. Tufts bright green 2—4 c. m. high not tomentose. — In high alp. region. *Eur.* Switzerl.: Culmann»: Limpricht,

bb. Capsule short thick gen. not distinctly constricted.

87. **B. synoico-caespitium** C. M. et Kindb. cat. Can. m.

Capsule large oval or obovate pendent; neck short; lid low mamillate; cilia appendiculate; pedicel geniculate below middle, arcuate at apex, 5—8 c. m. long. Leaves ovate or ovate-oblong reflexed; costa long-excurrent, often denticulate above. Tufts about 1 c. m. high, radiculose only at base. — Gravel in alps r. *Amer.* Can. Brit. Col.: Macoun.

88. **B. lonchocaulon** C. Mueller.

»Leaves small reflexed all around, ovate-lanceolate subdecurrent; cells pellucid. Capsule small oval; cilia appendiculate, pedicel about 3 c. m. long. Stems subglutinous elongate radiculose. Resembles somewhat *B. bimum* but more slender. — *Amer.* r. U. S. Colorado»: C. M. in Flora 1875.

89. **B. dovrense** Schimper.

»Leaves ovate suddenly short-acuminate indistinctly limbate faintly reflexed. Capsule oval-ovate yellowish; neck short; segments hyaline adhering to the yellowish teeth; cilia rudimentary; spores scarcely 0,02 m. m. Stem about 2 c. m., pedicel 1 c. m. long. Tufts tomentose green above. — Wet turfy soil in alps r. *Eur.* Norway near Kongswold in Dovrefjeld: Lorentz»: Schimper syn.

90. **B. caespitiiforme** Notaris.

»Leaves subovate reflexed in lower half, limbate in upper part. Capsule subpiriform small-mouthed; neck not long; lid low mamillate; teeth brown-yellow; cilia not appendiculate; pedicel 1 c. m. long, stem not longer. Tufts tomentose yellowish green. Monoecious. — In higher alp. region r. *Eur.* Switzerland: Carestia»: Limpricht.

8. Gemmiformia.

A. Leaves not distinctly reflexed at borders, gen. not limbate.

91. **B. subrotundum** Bridel.

Leaves ovate-oblong short-acuminate acute gen. small; costa short-excurrent. Capsule pale brown oval or subglobose, with thick or indistinct neck; teeth yellow; segments long, gaping or fenestrate; cilia short r. appendiculate; lid small mamillate. Spores nearly 0,02 m. m. Us. monoecious. — Stony ground in alps and arctic districts r. *Eur.* Norway! R. Hartman. *Amer.* Greenl.: Vanhoeffen. Can.: Macoun.

* **B. turfatum** Kindb. in Botan. notiser 1896.

Leaves larger, sometimes narrowly limbate; costa gen. sub-

percurrent. Capsule larger, brown, more distinctly necked and faintly constricted when dry; cilia very short mostly wanting. Spores smaller. Stem more distinct. Dioecious. — Turfy soil in higher subalp. region r. *Eur.* Norway near Kongswold!

92. **B.gemmuligerum** Kindb. n. sp.

Leaves subovate obtusate small; those of shoots broader, obtuse; costa long-excurrent. Capsule brown oblong or obovate with short thick neck, distinctly constricted when dry, not large; teeth yellow; segments long fenestrate; cilia long appendiculate; lid large apiculate or mamillate. Spores about 0,01 m. m. Monoecious or dioecious. — *Amer.* r. *Can.* Assa: Macoun.

93. **B.subgemmauligerum** Kindb. n. sp.

Leaves subovate short-acuminate acute distinctly limbate somewhat small; costa short-excurrent. Capsule pale brown suboblong strangulate not large; neck distinct longish; segments entire; cilia long and long-appendiculate; lid mamillate not small; pedicel about 2 c. m. long. Spores gen. 0,02 m. m. Dioecious. — Sandy ground in subalp. districts r. *Eur.* Norway in Foldal near L. Elvedal 1897!

B. Leaves distinctly reflexed and limbate.

94. **B.microstegium** Bryol. eur.

Leaves narrowly ovate-lanceolate long-acuminate acute, reflexed often all around, not large; costa long-excurrent. Capsule pale brown suboblong with long and distinct neck, not large; teeth pale; segments long fenestrate; cilia long appendiculate; lid small apiculate. Spores nearly 0,02 m. m. Us. synoecious. — Dry earth in alp. regions r. *Eur.* Norway!

95. **B.submicrostegium** Kindb. in Botan. notiser 1896.

Leaves broadly ovate-lanceolate or ovate-oblong, acute gen. long-acuminate, reflexed all around and distinctly limbate (at least the upper of fruiting stem), not large; costa long-excurrent. Capsule pale brown oval-oblong short-necked gen. small; teeth yellowish; segments fenestrate shorter than basal membrane; cilia long appendiculate; lid small mamillate. Spores about 0,01 m. m. Dioecious or monoecious. — On earth in higher subalp. region r. *Eur.* Norway Tronfjeld and near Kongswold by Goverlivand!

96. **B.acutiusculum** C. Mueller.

»Leaves oblong acuminate; costa short-excurrent. Capsule oval-piriform with somewhat long curved neck, minute; teeth brownish; segments not perforated; cilia long, short-appendicu-

late above; lid small subacute. Dioecious. Habit of *B. subrotundum*. — Rocks in arctic districts r. *Amer.* Alaska: Krause*. C. M. in Flora 1887.

II. *Pachylophus* Kindb.

1. *Argenteiformia*.

A. Leaves gen. obtusate; costa (exc. *B. nitidulum*) not excurrent.

a. Leaves sparingly chlorophyllose, silver-glossy, not reflexed, not r. with hairpoint. Tufts low.

97. *B. argenteum* L.

Leaves subovate often apiculate; costa subhyaline not or r. confluent with hairpoint. Capsule oval-oblong strangulate blood-red or pale red. — Bare earth, stones and roofs. *Eur.* common. Sweden etc. *Amer.* not r. Can.: Macoun. U. S.: Langlois, com. Cardot.

b. Leaves distinctly chlorophyllose, not reflexed. Capsules unknown.

98. *B. veronense* Notaris. — *Argyrobryum virescens* Kindb. Laubm. S. u. N.

Leaves broad-ovate or ovate-oblong, obtuse, reddish at base; cells rhombic shorter than in *B. argenteum*; costa yellow abbreviate. Branches subclavate pale green. Tufts sometimes 2—3 c. m. high. — In water on stones and sand r. *Eur.* Norway!; Kaurin. *Amer.* Labrador: Waghorne.

c. Leaves chlorophyllose, more or less reflexed.

99. *B. Blindii* Br. eur. — *B. Kiærrii* Lindb.

Leaves oval-oblong subobtuse: only uppermost (narrowly) reflexed. Capsule blood-red obovate; cilia sometimes not appendiculate. Dioecious. — Wet sand princ. by rivers, r. on rocks, r. *Eur.* Norway!; F. Kiær. France: Boulay. *Amer.* Can.: Macoun.

* *B. oblongum* Lindberg.

Leaves more obtuse. Capsule sometimes suboblong. — Wet sand r. *Eur.* Norway!; Kaurin. Finl.: Brotherus.

100. *B. teres* Lindberg.

Leaves broad-ovate obtuse: only uppermost apiculate and reflexed. Capsule pale brown suboblong; cilia appendiculate; pedicel about 1 c. m. long. Resembles somewhat *B. calophyllum*. — Arctic district r. *Eur.* Spetsbergen: Berggren.

101. *B. bulbifolium* Lindberg.

Leaves ovate obtuse with deflexed point: only uppermost reflexed. Capsule brown-red obovate; cilia appendiculate. Stem

nearly indistinct with gemmiform shoots. Synoecious. — Arctic district r. *Eur.* Lapland: Norrlin»: Lindberg.

102. *B. nitidulum* Lindberg.

Leaves subovate subobtuse, narrowly limbate, recurved all around; costa sometimes short-excurrent. Capsule obovate pale yellow or brown. Stem short; shoots subgemmiform with somewhat loosely disposed leaves. Synoecious or monoecious. — Northern, princ. arctic districts r. — *Eur.* Spetsbergen: Berggren. Norway: Kaurin. *Amer.* Greenl.: Vanhoeffen.

B. Leaves short-acuminate; costa, at least in uppermost leaves, excurrent. Capsule not or indistinctly constricted below mouth.

103. *B. atropurpureum* Wahlenberg.

Leaves subovate gradually acuminate, reflexed below; upper shoot-leaves glomerate. Capsule blood-red suboval; teeth yellowish or pale red; cilia appendiculate. Tufts small pale green 0,5—1 c. m. high, often with gemmiform propagula. Dioecious. — Sandy earth and stone-walls. *Eur.* not uncommon. Sweden, Germany! *Amer.* r. Can.: Macoun.

*** *B. californicum* Sullivant.**

Leaves faintly reflexed. Capsule red oblong. »Cilia not appendiculate»: Lesq. et Jam. — *Amer.* r. U. S.: Bolander, com. Cardot.

*** *B. arenarium* Juratzka.**

»Leaves shorter, less reflexed; cells shorter. Capsule red-brown. — Sometimes inundated places r. *Eur.* Austria: Juratzka»: Limpricht.

104. *B. Garovaglii* Notaris.

»Leaves subovate short-acuminate, gen. not reflexed; costa scarcely excurrent. Capsule chestnut-brown broad-oval; teeth brown-yellow; cilia appendiculate. Tufts small dusky green, scarcely 1 c. m. high. Synoecious. Habit of *B. atropurpureum*. — Alp. districts r. *Eur.* Italy: Garovaglio»: Limpricht.

*** *B. confertum* Limpricht.**

»Leaves broader, those of shoots obtuse. Tufts very dense, pale green above, 2—2,5 c. m. high. Capsules unknown. — Alp. rocks r. *Eur.* Austria: Breidler»: Limpricht.

105. *B. microglobum* C. M. et Kindb. cat. Can. m.

Leaves ovate-oblong short-acuminate, reflexed below; upper cells short; costa short-excurrent. Upper shoot-leaves glomerate ovate obtusate not reflexed. Capsule small pale red subobovate or subglobose; pedicel 3 c. m. long. Tufts green and dense, radi-

culose below, about 1 c. m. high. — Earth r. *Amer. Can.*
Ont.: Dearness, com. Macoun.

2. *Versicoloriformia*.

106. *B.versicolor* Al. Braun.

Leaves ovate-oblong or ovate-lanceolate, acuminate acute, reflexed crowded not decurrent. Capsule finally reddish, round-oval. Stem very short. Tufts scarcely 1 c. m. high. — Wet sand princ. by rivers r. *Eur.* Austria: Venturi; Gander. Germany: Progel.

107. *B.coronatum* Schwægrichen.

Leaves as in the last but looser disposed and not reflexed; those of shoots decurrent. Capsule yellowish or pale brown, oval-oblong. — *Amer. r.* »U. S.«: Lesq. et Jam. (Cuba: Wright, com. C. Mueller).

108. *B.excurrens* Lindberg.

Leaves subovate abruptly acuminate acute more or less reflexed, crowded and not decurrent. Capsule small pale red oval or subobovate. Tufts reddish about 1 c. m. high. — Sandy alp. places r. *Eur.* Norway in Dovrefjeld!

3. *Zonatiformia*.

A. Tufts dense and tomentose.

109. *B.zonatum* Schimper.

Leaves subovate short-acuminate apiculate, neither limbate nor reflexed, subdecurrent, large and not densely crowded; costa of the uppermost leaves often short-excurrent. Capsules and flowers unknown. Tufts very compact, zonate, brown below, often high. — Alp. rocks r. *Eur.* Norway in Dovrefjeld!

110. *B.zonatiforme* Kindb. in Botan. notiser 1896.

Leaves subcircular obtusate subobtusate, sometimes (narrowly) limbate, crowded: uppermost apiculate; costa not excurrent. Habit of the last, but tufts are lower, about 2—3 c. m. and wholly brown. Capsules and flowers unknown. — Alp. rocks r. *Eur.* Norway in Dovrefjeld!

111. *B.Limprichtii* Kaurin.

Differs from *B. zonatum*: Leaves broad-ovate obtusate, either subobtusate or abruptly apiculate, more crowded and less large. Tufts less tomentose often green, 2 c. m. or higher. Polygamous. Capsule pale brown suboblong or subobovate, not constricted; lid small; cilia unknown. — Higher alp. region r. *Eur.* Norway in Dovrefjeld 1500 m. a. s.l.; Kaurin.

B. Tufts loosely cohering, not tomentose.

112. **B. Gerwigii** C. Mueller. — Hypnum C. M.; Bryum Limpr.

Leaves broad-ovate subobtusate, neither limbate nor reflexed, not densely crowded, whitish green, sometimes sparingly chlorophyllose. Stems about 3 c. m. high. Capsules and flowers unknown. — Inundated rocks r. *Eur.* Switzerland: Gerwig, com. C. Mueller.

IV. *Cladodium* Schimper, in part.

1. *Erythrodontia*.

113. **B. Marratii** Wilson.

Leaves oval-oblong blunt not or scarcely reflexed. Capsule subglobose; cilia indistinct; pedicel 2—3 c. m. long. Stem very short. — Wet places near sea r. *Eur.* Engl.: Rogers; Percival. Netherland: Buse.

2. *Arcticiformia*.

A. Capsule us. abruptly narrowed to the very small mouth. Leaves not crowded.

114. **B. arcticum** R. Brown. — Pohlia R. Br.; Bryum Br. eur.

Leaves suboblong, more or less reflexed, broadly red-limbate, finally roe-red or purplish; costa percurrent or short-excurrent, finally red. Lower shoot-leaves decurrent. Capsule thick suboval often oblique, brown; teeth and endostome orange; cilia not appendiculate. Fruiting stems very short, scarcely tufted; shoots short, radiculose at base. — Earth in alp. region princ. in northern districts r. *Eur.* Norway! *Amer.* very r. *Can.*: Macoun.

115. **B. flavescens** Kindb. enum. bryin. dovr.; rev. bryol. 1896.

Leaves suboblong scarcely reflexed us. broadly yellow-limbate, often finally brown-red, sometimes decurrent; costa short-excurrent yellowish or brown. Capsule thick subobovate oblique often curved, finally brown; teeth and endostome yellowish; cilia often appendiculate. Stems as in the last, more distinctly tufted. — Alp. rocks r. *Eur.* Norway near Kongswold!

116. **B. Lindbergii** Kaurin.

Agreeing with the last in often appendiculate cilia. Differs from it in leaves longer, oblong-lanceolate, and green; stems higher, densely tufted. Us. monoecious or dioecious. — Moist alp. rocks r. *Eur.* Norway!

B. Capsule not abruptly narrowed to the less contracted mouth. Leaves yellowish green and yellowish-limbate, not red. Stem more distinct, radiculose in lower half.

a. Capsule yellowish; teeth orange; cilia not appendiculate. Leaves oblong-lanceolate, broadly limbate. Us. synoecious.

117. **B. arcuatulum** (Limpricht) Kindb. (new name). — *B. arcuatulum* Limpr., non Hooker et Wilson.

Leaves distant scarcely reflexed, decurrent; costa often long-excurrent. Capsule subclavate often oblique and curved; endostome yellow. Stems not or loosely tufted. — Moist alp. rocks r. *Eur.* Norway!; Kaurin.

118. **B. callistomum** Philibert.

Differs from the last in capsule thicker, subobovate, neither oblique nor curved, pale yellow; endostome orange. — Alp. rocks r. *Eur.* Norway!

119. **B. Kindbergii** Philibert. — *B. schisticola* Kindb. mser.

Leaves crowded, often reflexed below middle, not decurrent, pale-yellowish limbate; costa gen. long excurrent. Capsule not (or indistinctly) oblique nor curved, thick and subobovate, faintly constricted below the not red mouth; endostome yellow; lid mamillate. Shoot-leaves not distinctly limbate. Spores scarcely 0.03 m. m. Tufts dense. — Rocks of micaschiste in alps r. *Eur.* Norway, higher subalp. region near Kongsvold 900 mtr. a. s.l.; growing together with *Myurella tenerrima*. »Switzerl.«: Philibert.

* **B. helveticum** Philibert.

»Leaves narrower, subdecurrent and reddish. Capsule sub-oblique. — *Eur.* r. Switzerl.«: Philibert.

b. Capsule brown; teeth and endostome yellowish; cilia often appendiculate. Leaves suboblong indistinctly or somewhat narrowly limbate. Monoecious.

120. **B. stenocarpum** Limpricht.

Leaves not crowded, reflexed, sometimes decurrent; costa somewhat longly excurrent. Capsule narrowly obovate, scarcely oblique or curved. Spores large. Habit of *B. Sauteri*. Tufts low brown-green. — Alps r. *Eur.* Norway!

3. *Cernuiformia*.

A. Leaves gen. somewhat twisted when dry. Tufts green or brownish, us. loose. Cilia of endostome not appendiculate. Male flowers gemmiform. Spores large.

121. **B. cernuum** Swartz. — *Didymodon* Sw.; *Bryum* Lindb.; *B. uliginosum* Br. eur.

Leaves not decurrent, oblong-lanceolate long-acuminate, reflexed below, broadly yellowish-limbate us. serrulate near apex; costa percurrent or short-excurrent. Capsule subobovate or clavate, oblique and curved, pale or finally reddish brown; teeth brown-yellow; lid subconic mamillate; pedicel long. Tufts olive-green

or brown, radiculose at base, 1—2 c. m. high. Monoecious. — Wet places princ. below alps. *Eur.* not uncommon. Sweden!; S. J. Lindgren. *Amer.* r. Can.: Macoun.

122. **B. calcareum** Venturi.

Leaves decurrent, oblong-lanceolate or sublingulate, long-acuminate, scarcely reflexed, narrowly limbate; costa short-excurrent. Capsule subclavate r. curved, brown; teeth yellowish; lid subconic obtuse; pedicel somewhat long. Tufts green, radiculose at base, about 1 c. m. high. Monoecious. — Calcareous caverns in alp. region r. *Eur.* Austria 2100 metr. a. s.: Venturi.

123. **B. luridum** Ruthe.

Leaves not decurrent, oval-oblong long-acuminate, reflexed all around, broadly brown-limbate, brown at apex; costa long-excurrent. Capsule us. thick, suboval or round-oval, not oblique and scarcely curved, pale brown; teeth yellow; lid convex or subconic, obtuse or mamillate; pedicel somewhat long. Tufts low and greenish, radiculose. Synoecious. — On earth below alps r. *Eur.* Germany: Ruthe, com. Warnstorf.

B. Leaves not twisted, yellowish or finally red. Tufts dense. Cilia appendiculate. Spores sometimes not large. Male flowers disciform.

124. **B. meeseoides** Kindb. bull. Torr. club XVI.

Leaves not decurrent, ovate-oblong or broadly ovate-lanceolate, not distinctly reflexed, faintly denticulate, brown-limbate; costa abbreviate or subpercurrent. Capsule shorter than neck, narrowly piriform or subclavate, us., princ. unripe, arcuate (*Meesea*-like); teeth pale yellow; basal endostomial membrane nearly indistinct; lid mamillate; pedicel long. Stem often longish. Dioecious. — Wet rocks r. *Amer.* Can.: Macoun. Alaska: J. M. Macoun.

4. *Purpurascens* formia.

A. Stems not or loosely tufted. Leaves gen. narrowly limbate.

a. Spores gen. not large, about 0,02 m. m. Capsule gen. narrow; cilia not appendiculate; pedicel long. Leaves decurrent, faintly reflexed us. rose-red; costa gen. subpercurrent. Stems gen. very short and scarcely or not cohering; shoots long loosely foliate. Us. synoecious.

125. **B. purpurascens** R. Brown. — Pohlia R. Br.; Bryum Br. eur.

Leaves short-decurrent suboblong or oblong-lanceolate, more or less limbate. Capsule suboblong pale yellow or finally pale brown; teeth yellow; lid large deplanate, mamillate or subapi-

culate. — Sandy places by rivers and rivulets in northern alps r. *Eur.* Norway; Sweden: Arnell. Finl.: Brotherus. *Amer.* Greenl.: Berggren. Alaska: J. M. Macoun. Can.: J. and J. M. Macoun; Breutel.

* **B. opdalense** Limpricht.

Leaves shorter, more distinctly limbate. Capsule with shorter neck. — *Eur.* Norway!; Kaurin.

* **B. autumnale** Limpricht. — »Webera hermaphrodita Ren. et Card.»: Waghorne.

Leaves suboval, longer decurrent. Shoots shorter, yellowish green. Capsule somewhat longer necked; teeth brown-yellow; lid apiculate. — R. *Eur.* Norway!; Kaurin. *Amer.* Can.: Waghorne.

126. **B. subpurpurascens** Kindb. cat. Can. m.

Leaves long-decurrent oblong-lanceolate reddish limbate rose-red; costa scarcely excurrent. Capsule very narrow, distinctly stragulate, curved when unripe; teeth orange; lid large conic obtuse. Spores smaller than in the last; fruiting stem more distinct. Dioecious. — Wet earth r. *Amer.* Can. Brit. Col. by a railway: Macoun.

b. Spores gen. very large. Capsule gen. thick; teeth orange, incurved when dry; pedicel us. very long and thick. Leaves gen. not decurrent, more or less reflexed. Cilia gen. not appendiculate (»in Californian specimens sometimes long-appendiculate»: Lesq. et Jam.). Stems and shoots short.

127. **B. warneum** Blandow. — *B. oelandicum* Philibert.

Leaves not crowded, gen. narrow-limbate and faintly reflexed, sometimes short-decurrent, suboval, sometimes denticulate above, often finally rose-red; costa percurrent or short-excurrent. Capsule large oval-globose reddish yellow or finally reddish brown; lid convex mamillate. Spores often about 0,05 m. m. Sometimes synoecious. The »flagelliform shoots», delineated in Br. eur., not are essential. — Wet sand, princ. near sea, r. in alps, r. *Eur.* Sweden! Germany: Warnstorf. France: Boulay. *Amer.* »U. S.»: Lesq. et J.

128. **B. Biddlecomiae** Austin. — *B. Edwardsianum* C. M. et Kindb. l. c.

Differs from the last in leaves narrower, longer acuminate, entire, more distinctly limbate and reflexed; costa long-excurrent. Capsule narrower, less inflated, more stragulate; lid lower. — Damp sandy soil r. *Amer.* Can., Prince Edw. isl.: Macoun. »U. S., Colorado»: Lq. et J.

129. **B. mamillatum** Lindberg.

Upper leaves glomerate not decurrent, broadly limbate, reflexed ovate-lanceolate entire green; costa short-excurrent. Capsule thick subovate brown-yellow; lid deplanate mamillate; pedicel long. Spores less large than in *B. warneum*. — On shores of Baltic sea r. *Eur.* Sweden: Zetterstedt.

130. **B. serotinum** Lindberg.

Differs from the last in leaves narrow-limbate, cells narrower; capsule longer necked, pedicel less long; stems more distinct, less loosely tufted. — Wet sand r. *Eur.* Sweden: H. W. Arnell.

B. Tufts dense. Leaves gen. broadly limbate.

a. Fruiting stem distinct with somewhat long loosely foliate shoots. Capsule gen. narrow.

131. **B. Brownii** Bryol. eur.

Leaves green not crowded, subdecurrent and narrowed at the orange-colored base, reflexed below, ovate-oblong or narrower; costa yellowish often long-excurrent. Stem-leaves broadly limbate; shoot-leaves less distinctly limbate with short-excurrent costa. Capsule pale finally brown-yellow; cilia not appendiculate; lid apiculate; pedicel often long. Stem and shoots radiclelose in lower half. *Us.* monoecious. — Wet rocks and swamps in alp. northern regions r. *Eur.* Norway! *Amer.* Greenl.: Berggren.

132. **B. erubescens** Kindb. cat. Canad. m.

Stem-leaves red-brown crowded not decurrent, broadly reddish or brownish limbate, scarcely reflexed, ovate-oblong; costa red-brown somewhat long-excurrent. Shoot-leaves narrower limbate, sometimes short-decurrent. Capsule finally pale brown, distinctly strangulate; cilia appendiculate; lid mamillate; pedicel not long. Spores large. Dioecious. — Rocks r. *Amer.* Can. Rocky mts: Macoun.

b. Fruiting stem very short with short shoots. *Us.* synoecious.

133. **B. Lindgrenii** Schimper. — »*B. purpurascens*»: Lindgren musci succ. exsicc.

Leaves crowded not decurrent, often reflexed, ovate-oblong short-acuminate, often denticulate above; costa subpercurrent. Capsule suboblong not large, pale brown; teeth brown-yellow; cilia not appendiculate; lid deplanate mamillate; pedicel somewhat long. Tufts small yellowish green or pale red. — On the shore of a lake (Wenern) r. *Eur.* Sweden near Lidköping: S. J. Lindgren.

134. **B. micans** Limpricht.

Leaves not crowded, subdecurrent, reflexed at base, oval-oblong or sublanceolate; costa, only of uppermost leaves, short-excurrent. Capsule somewhat small, thick suboval brownish; teeth orange, incurved when dry; cilia not appendiculate; lid subconvex mamillate; pedicel not long. Tufts brown-green. — Turfy soil in northern alps r. *Eur.* Norway! Kaurin. *Amer.* Greenl.: Berggren.

* **B. inflatum** Philibert.

Leaves more decurrent; costa longer excurrent. Capsule thicker. — Northern alps r. *Eur.* Norway! Kaurin.

135. **B. pycnodermum** Limpricht.

Leaves not crowded, subdecurrent, reflexed at base, oblong-lanceolate long-acuminate; costa of uppermost leaves long-excurrent. Capsule suboblong dark brown, finally blackish; teeth brown-yellow; cilia appendiculate; lid deplanate mamillate; pedicel often long. Habit of *B. cirratum*. — Wet sand by water in northern alps r. *Eur.* Norway! Kaurin.

5. Calophylloidea.

136. **B. calophyllum** R. Brown.

Leaves broad-ovate obtusate (obtuse or acute), often sublimbate, not reflexed, sometimes decurrent; cells large; costa not excurrent. Capsule suboval; cilia sometimes appendiculate; pedicel us. long, often 3 c. m. or more. — Swamps princ. in alps r. *Eur.* Norway! Engl.: Rogers. Spetsbergen: Berggren. *Amer.* Greenl.: Vanhoeffen.

137. **B. acutum** Lindberg.

Leaves ovate-oblong acute more or less acuminate, often narrowly limbate and reflexed below, not decurrent; cells smaller than in the last; costa often short-excurrent. Capsule us. suboblong and long-pedicellate; cilia smooth. Stem not high. — Sandy borders of rivers r. *Eur.* Finland: Brotherus. (*Asia*, *Siberia*: Arnell).

* **B. Axel-Blyttii** Kaurin.

Capsule subobovate shorter-pedicellate. — Sand by rivers in alps r. *Eur.* Norway! Kaurin.

6. Penduliformia.

A. Leaves gen. not distinctly (or very narrowly) limbate; costa gen. not excurrent. Us. synoecious.

a. Spores large, about 0.04 m. m.

138. **B. brachyneuron** Kindb. Ottawa Naturalist V.

Leaves small broad-ovate short-acuminate reflexed narrowly

limbate, nearly crowded, sometimes short-decurrent; comal glomerate; upper cells subrhombic; costa often abbreviate. Capsule thick round-oval or subobovate, somewhat long-necked and constricted below mouth, reddish brown; teeth broader than in *B. pendulum*; segments also orange, adhering; pedicel about 1 c. m. long, scarcely emerging above tufts. Fruiting stem distinct and tomentose; shoots short. — Arctic district r. *Amer.* Alaska: J. M. Macoun.

b. Spores somewhat small, about 0,02 m. m. Leaves not decurrent.

139. *B. lacustre* Blandow. — »B. Barnesi Wood»: Limpricht.

Leaves ovate-oblong short-acuminate acute not or indistinctly limbate, broadly recurved nearly all around, entire; costa gen. subpercurrent. Capsule small suboval short-necked; lid small; teeth pale yellow; pedicel long. Stems very short, loosely tufted; shoots filiform. — Wet sand often near lakes, princ. boreal caps. *Eur.* not r. Norway! Finland: Lindberg. Germany: Warnstorf. England: Rogers.

140. *B. Knowltoni* Barnes bot. gazette 1889.

»Leaves ovate to obovate-lanceolate short-acuminate, us. indistinctly limbate, slightly revolute or plane, entire or nearly so; costa not or shortly excurrent. Capsule oblong-piriform; cilia rudimentary; lid small; pedicel about 1 c. m. long. Tufts dense and tomentose, 1—2 c. m. high. Spores about 0,025 m. m. — Crevices in rocks r. *Amer.* Can. N. Foundl.: Barnes.

141. *B. flexuosum* Austin.

Differs from *B. lacustre* in leaves pale red not reflexed; capsule narrower; lid large; tufts dense less low. Dioecious. — Gravelly ground near water r. *Amer.* Can. Brit. Col.: Macoun.

B. Leaves broadly limbate, loosely disposed and decurrent (at least the lower). Us. monoecious.

142. *B. Moëi* Schimper.

»Leaves very narrow, ovate-lanceolate long-acuminate entire; upper reflexed; apical cells suboblong; costa long-excurrent. Capsule thick suboval not constricted; lid small flat mamillate; teeth orange. Tufts sparingly radiculose, 2 c. m. high. — Northern alps r. *Eur.* Norway: N. G. Moë»: Schimper and Limpricht.

143. *B. paludicola* Schimper.

»Lower leaves small, subovate short-acuminate acute, loosely disposed: upper somewhat large, crowded, gen. broad-oval, reflexed all around, yellow-limbate; costa short-excurrent. Cap-

sule subpiriform dark fuscous; lid mamillate somewhat large; teeth yellow, orange below; pedicel 3 c. m. long. Tufts dense 2—3 c. m. high. Spores about 0,03 m. m. Sometimes synoecious. — Swamps in alps r. *Eur.* Norway near Kongswold: Lorentz»; Schimp. and Limpricht.

C. Leaves gen. narrowly limbate not decurrent us. crowded; costa excurrent. Us. synoecious.

a. Leaves not (or only at base) reflexed. Fruiting stem nearly indistinct with very short shoots. Capsule thick, smaller than in *B. pendulum*. Spores large. Comal shoot-leaves gen. not glomerate.

144. **B. archangelicum** Bryol. eur. — »B. Holmgrenii Lindb.»: Kaurin.

Leaves ovate-oblong short-acuminate; apical cells subrhombic; costa long-excurrent. Capsule subobovate; peristome pale yellow; segments free; lid flat mamillate; pedicel short. — Bare earth in alp. regions r. *Eur.* Norway!; Kaurin. Sweden: E. Adlerz. Russian Lapland: Aongström. *Amer. Can.*: Macoun.

145. **B. planifolium** Kindb. Laubm. Schw. u. Norw.

Leaves broad-ovate short-acuminate; middle cells rhomboidal, apical scarcely narrower; costa not long-excurrent. Capsule subpiriform; peristome orange; segments adhering; lid apiculate not deplanate; pedicel not long. — Alp. rocks r. *Eur.* Norway, Dovrefjeld!

b. Leaves reflexed, us. all around.

aa. Peristomial teeth pale; segments yellow. Capsule subglobose very small. Spores somewhat small, about 0,02 m. m.

146. **B. globosum** Lindberg.

Leaves oval acuminate acute, reflexed to above middle, entire; costa of uppermost leaves short-excurrent to a deflexed point. Capsule pale reddish-yellow; lid small; pedicel short. Stems very short; tufts dense about 0,5 c. m. high. — Arctic district r. *Eur.* »Spetsbergen»: Lindberg. (*Asia*, Sibiria: Sahlberg, com. Brotherus.)

bb. Peristomial teeth brown-yellow; segments yellow. Capsule suboval. Spores about 0,03 m. m.

147. **B. Græffii** Schliephacke.

Upper leaves gen. ovate-oblong, reflexed all around, entire; costa more or less excurrent. Capsule brownish not constricted; lid small; pedicel about 1,5 c. m. long. Stem very short with short shoots. Tufts about 0,8 c. m. high or lower, sometimes loose. — Schistose rocks in alps r. *Eur.* Norway: Hagen.

148. **B. Lorentzii** Schimper.

Differs from the last: »Upper leaves longer acuminate. Capsule constricted below mouth, longer necked; pedicel about 3 c. m. long. Stem with longer shoots, their leaves decurrent. — Turfy soil near Atlantic sea r. *Eur.* Norway»: Jörgensen in Christiania Vidensk. Selsk. Forhandl. 1894.

149. **B. Kaurinianum** Warnstorf.

Differs from *B. Græfii*: Upper leaves with long-excurrent costa. Pedicel of capsule 4—5 c. m. long. — Schistose rocks in alps r. *Eur.* »Norway near Kongswold in Vaarstien»: Kaurin; Sweden in Lapland near Virijaur: Miss A. Cleve, com. E. Nyman.

cc. Peristome gen. orange. Capsule sometimes narrow. Spores gen. large. Fruiting stem us. distinct.

150. **B. pendulum** Hornschuch. — *Ptychostomum* Hsch.; *Bryum* Schimper.

Leaves ovate-oblong narrowly acuminate, reflexed all around: comal (also on shoots) glomerate; apical cells narrow; costa often long-excurrent. Capsule thick suboval; neck short; segments often not well-evolute; lid us. apiculate; pedicel gen. not long. Fruiting stem tomentose in lower half; shoots short. — Earth and rocks also in alps. *Eur.* not uncommon. Sweden, Norway, Germany, Switzerl. France: Renauld. *Amer.* Greenl.: Berggren. Alaska: J. M. Macoun. Can.: J. Macoun; Waghorne. 151. **B. compactum** Hornschuch.

Differs from the last in leaves narrower and longer acuminate; capsule narrow subclavate; segments not adhering. Us. monoecious. — Alps r. *Eur.* »Germany»: Limpricht. *Amer.* Greenl.: Vanhoeffen.

152. **B. Roellii** Philibert.

Leaves narrowly ovate-oblong, longer acuminate than in *B. pendulum*, reflexed nearly all around, not distinctly limbate in upper part; upper and middle cells narrow; costa sometimes short-excurrent. Capsule narrow suboblong, sometimes scarcely longer than neck; lid apiculate; pedicel somewhat long. Fruiting stem nearly indistinct with gemmiform shoots. Spores smaller than in *B. pendulum*. — *Amer.* r. U. S.: Roell, com. Brotherus. Can. Cypress hills: Macoun 1894.

153. **B. angustirete** Kindb. bull. Torr. club XVI.

Differs from *B. pendulum*: Stem-leaves more distinctly limbate and strongly recurved. Capsule narrowly oblong; lid not apiculate; pedicel long; spores smaller. Shoots longer, not thicker

above; their leaves longer acuminate with narrower cells. —
Amer. r. Can.: Macoun.

154. *B. alaskanum* Kindb. n. sp.

Leaves broad-ovate apiculate or very short-acuminate, reflexed all around; cells wide, the upper subrhombic; costa short-excurrent. Capsule short but not thick, subclavate-piriform; lid convex mamillate; pedicel not long. Fruiting stem tomentose with shorter and longer shoots. Uppermost leaves of stem and shorter shoots glomerate; those of longer shoots not glomerate. — Arctic district r. *Amer. Alaska*: J. M. Macoun.

D. Leaves gen. broadly limbate and not (or only on shoots) decurrent, us. crowded; costa excurrent. Us. synoecious.

a. Spores very large, about 0,04—0,05 m. m.

155. *B. longisetum* Blandow.

Leaves ovate-oblong acuminate, not reflexed above, smaller than in *B. inclinatum*: the uppermost not distinctly glomerate; upper cells narrow; costa short-excurrent. Capsule thick sub-oval short-necked; lid convex apiculate; teeth yellow; pedicel us. 5—10 c. m. long. Stems very short or nearly indistinct, not densely cohering; shoots short. — Swamps and turf-moors also below alps r. *Eur. Norway!* Germany: Holler, com. Warnstorf.

* *B. labradorensis* Philibert.

Leaves somewhat shorter and broader; costa longer excurrent. Capsule shorter; pedicel gen. about 3 c. m. long. — Alp. swamps r. *Eur. Norway!* *Amer. »Can.»*: Philibert.

156. *B. murmanicum* Brotherus.

Leaves ovate acuminate, reflexed all around: the uppermost glomerate; upper cells suboblong; costa short-excurrent to an often deflexed point. Capsule broad-oval somewhat long-necked; lid flat apiculate; teeth pale; pedicel 3 c. m. long. Stem about 1 c. m. high. Tufts dense blackish about 2,5 c. m. high; shoots glossy green. — Wet sand by rivers r. *Eur. Russian Lapland*: Brotherus.

b. Spores less large, about 0,03 m. m. or smaller. Upper leaves reflexed all around.

aa. Upper leaves obtusate or short-acuminate. Capsule subglobose scarcely longer than neck.

157. *B. salinum* Hagen.

Upper leaves ovate-oblong acute; costa somewhat long-excurrent (in lower leaves not excurrent). Capsule pale brown not constricted below mouth; lid small apiculate or rostellate; teeth

orange; pedicel about 1 c. m. long. Tufts dense greenish about 1.5 c. m. high. — On shores of Atlantic sea r. *Eur.* Norway: I. Hagen.

bb. Upper leaves us. long-acuminate. Capsule gen. suboblong, longer than neck.

158. ***B. inclinatum*** Swartz. — *Pohlia* Sw.; *Bryum* Br. *eur.*

Leaves narrowly ovate-oblong, the uppermost (also on shoots) us. glomerate; upper cells narrow; costa sometimes not long-excurrent. Capsule gen. suboblong; lid short-conic; pedicel about 3—4 c. m. long. Stem very short with short shoots. — On earth also in alps. *Eur.* not uncommon. Sweden, Norway! Finl.: Brotherus. *Amer.* Can.: J. Macoun; Waghorne. Alaska: J. M. Macoun.

159. ***B. lapponicum*** Kaurin.

Differs from the last: Leaves broader, subovate not long-acuminate; pedicel of capsule 5—6 c. m. long; lid mamillate; stem distinct; tufts more dense, about 2 c. m. high; spores somewhat larger. — *Eur.* Norway near Tromsø: Kaurin, com. N. Bryhn.

* ***B. subinclinatum*** Kindb. n. subsp.

Spores smaller about 0.02 m. m. Endostome adhering to teeth; lid apiculate. Tufts very dense and tomentose. — *Amer.* Can. northern Labrador: Macoun 1896.

160. ***B. Hagenii*** Limpricht.

Differs from *B. inclinatum*: Leaves longer, often denticulate above; the lower on shoots (barren stems) short-decurrent. Lid of capsule low; spores larger. Tufts higher. — Rocks r. *Eur.* Norway: I. Hagen.

* ***B. curvatum*** Kaurin et Arnell.

Capsule and its neck sometimes curved or oblique. — *Eur.* r. Norway: Arnell.

161. ***B. Froudei*** Kindb. in Ottawa Naturalist V.

Leaves ovate-lanceolate, twisted when dry: the uppermost not glomerate; upper cells very long and narrow; costa long-excurrent. Capsule oblong-obovate; lid flat mamillate or subapiculate; pedicel about 3 c. m., not much longer than tufts. Spores scarcely 0.03 m. m. Stem distinct and tomentose with longish shoots. — *Amer.* r. Alaska: J. M. Macoun. Can.: J. Macoun.

7. Rutilantiformia.

162. ***B. rutilans*** Bridel. — *B. oeneum* Blytt.

Leaves ovate-lanceolate long-acuminate, broadly limbate and reflexed, gen. entire, twisted when dry, finally copper-red; costa

short-excurrent. Capsule brown. Stem us. high, often with filiform propagula. Tufts dense tomentose, often zonate when dry. Us. dioecious, r. fruiting. — Wet rocks in northern alps r. *Eur.* Norway in Dovrefjeld!; R. Hartman. *Amer.* Greenl.: Berggren.

163. *B. campylocarpum* Limpricht. — »*B. angustifolium* Kaurin» (not Bridel) ?

Differs from the last: Leaves denticulate above, not or indistinctly reflexed, less twisted when dry; costa subpercurrent. Capsule sometimes shorter necked; lid more deplanate. Stem lower, less radiculose. Monoecious. — Wet rocks by rivulets in northern alps r. *Eur.* Norway!

V. Webera Hedwig; Schimper.

1. Crudiformia.

A. Leaves serrate not reflexed us. crowded; costa not percurrent. Capsule subclavate; cilia us. long.

a. Leaves short opal-glossy. Capsule gen. cernuous.

164. *B. erudum* L. — *Mnium* L.; *Bryum* Hudson.

Leaves suboblong short-acuminate: comal and perichetial longer acuminate. Capsule not constricted. Perigonial leaves patent. Tufts us. loose. Synoecious or paroecious but often also with discoid male flowers. — Earth and rocks common. *Eur.* Sweden, Norway, Switzerl.! *Amer.* Can.: J. Macoun. Alaska: J. M. Macoun.

b. Leaves long not opal-glossy. Capsule gen. suberect.

165. *B. nitescens* Kindb. in botan. notiser 1896. — *Bryum* (Webera) nitens Kindb. Laubm. S. u. N.; non Hooker.

Leaves oblong-lanceolate acuminate: perichetial long. Capsule not constricted; cilia long. Perigonial leaves erect. Tufts dense tomentose silky or golden glossy. Dioecious with gemmiform male flowers, r. synoecious. — Alpine and arctic districts r. *Eur.* Norway in Dovrefjeld! Sweden: A. Grape. *Amer.* Greenl.: Vanhoeffen. Can. northern Labrador: Macoun.

166. *B. longicollum* Swartz. — Webera Hedwig.

Leaves narrowly ovate-lanceolate long-acuminate: perichetial shorter than uppermost stem-leaves. Capsule faintly constricted, narrower than in the last; cilia sometimes short. Tufts sparingly radiculose silky or golden glossy. Paroecious without special male flowers. — Schistose and siliceous alp. rocks r. *Eur.* Norway! Switzerl.: Schimper. Austria: Venturi. *Amer.* »Cascade mts»: Lesq. et J.

167. **B. Bolanderi** Lesquereux.

Differs from the last: Leaves loosely disposed more patent. Capsule thicker more inclined. Tufts looser. Paroecious or dioecious. — *Amer. r. Can.*: Macoun.

168. **B. longibracteatum** Brotherus. — *Pohlia* Broth.; *Bryum* Kindb.

Leaves linear-lanceolate short-acuminate distant long-decurrent. Male flowers discoid; perigonial leaves long linear-lanceolate. Tufts loose glaucous green. Capsules unknown. Dioecious. — *Amer. r. U. S. Oregon*: Roell.

B. Upper leaves faintly serrate reflexed nearly all around; costa subpercurrent or short-excurrent. Capsule suboblong; cilia rudimentary.

169. **B. crassidens** Lindberg. — *Pohlia* Lindb.; *Bryum* Kindb.

Lower leaves small ovate apiculate not reflexed, distant, finally red; upper sublinear-lanceolate acuminate green silky glossy. Capsule often suberect. Tufts often dense. Male plants less radiculose; leaves gradually larger upwards; flowers discoid. Dioecious. — *Alp. rocks r. Eur. Norway*: N. Bryhn. *Sweden*: E. Nyman.

2. Nutantiformia.

A. Sterile stems us. with bud-like propagula. Leaves loosely disposed, only the uppermost glomerate; cells somewhat dilated. Dioecious r. fruiting. Stems not or loosely tufted.

170. **B. annotinum** Hedwig. — *Webera* Bruch.

Capsule suboblong red-yellow; teeth yellow; pedicel pale red. Uppermost leaves narrowly ovate-lanceolate or sublinear-subulate, sometimes decurrent; lower subovate-oblong not decurrent, not appressed when dry. Bulbilli us. red. — *Sandy or clayey soil. Eur. not common. Sweden, Norway! Amer. r. Greenl.*: Berggren. *Can.*: Macoun.

171. **B. proligerum** Lindberg. — *Pohlia* Lindb.; *Bryum* Kindb.

Capsule broad-oval dark brown-red; teeth brown-yellow; pedicel purplish. Leaves broader than in the last, more erect when dry. Bulbilli us. greenish. — *Sand or clay. Eur. probably not r. Switzerl., Sweden! Norway!*; S. O. Lindberg and E. Nyman.

B. Stem without bulbilli. Leaves crowded, at least the upper of fertile stems; cells narrow. Tufts us. dense.

a. Upper leaves serrate. Us. paroecious. Capsule with apiculate lid.

172. *B. nutans* Schreber. — Webera Hedwig.

Leaves ovate-lanceolate acuminate acute; upper narrower, faintly reflexed; costa r. subexcurrent. Capsule oval-oblong us. brown-red sometimes bicolored; cilia r. appendiculate. — Earth, rocks and swamps common. *Eur.* Sweden etc.! *Amer.* Can.: Macoun; Waghorne, U. S.: Roell.

* *B. cuspidatum* Kindb. n. subsp.

Perichetial leaves long-subulate gen. not reflexed; costa gen. long-excurrent. Stem very short. Dioecious. — Alps r. *Eur.* Norway!

* *B. canaliculatum* C. M. et Kindb. — Webera cat. Can. m.

Perichetial leaves with thicker, canaliculate sometimes excurrent costa. Cilia long-appendiculate. Lowest leaves short-decurrent. Spores larger. — Wet earth r. *Amer.* Can. Vanc. isl.: Macoun.

* *B. camptotrachelum* Renauld et Cardot.

Leaves erect but much longer than in *B. annotinum*; perichetial gen. with excurrent costa. Capsule sometimes with curved neck. Stem very short. Dioecious. — *Amer.* r. »U. S.»: Cardot.

* *B. Macounii* Kindb. n. subsp.

All leaves, also on sterile stems and shoots, distinctly serrate, not glossy, finally red, densely crowded, appressed when dry. — Rocks r. *Amer.* Can. Vanc. isl.: J. Macoun.

b. Leaves nearly entire. Dioecious or polygamous with subdiscoïd male flowers. Capsule with mamillate lid.

173. *B. Schimperii* C. Mueller.

Capsule brownish narrow; teeth pale. Leaves reflexed. Tufts often high and purplish. — Alp. swamps r. *Eur.* Scotl.: herb. Milde. *Amer.* Can. northern Labrador: Macoun. »Greenl.»: Berggren.

174. *B. Sphagni* »Bridel»: C. Mueller. — *B. sphagnicola* Br. eur.

Capsule pale brown; teeth yellowish; pedicel yellowish often very long. Leaves not reflexed, gen. distant. Stems r. tufted. — Turf-moors r. *Eur.* Sweden, Norway! Germany: Geheeb. *Amer.* Can.: Macoun.

3. *Pulchelliformia*.

A. Capsule strangulate; teeth brown-red; annulus none. Leaves crowded; cells wide, the upper subrhombic.

175. *B. carneum* L. — Webera Schimper; *Mniobryum* Limpricht.

Leaves broadly ovate-lanceolate or ovate-oblong short-acuminate not decurrent; costa red not percurrent. Capsule broad oval

red-yellow or finally brown-red. Tufts green. — On earth. *Eur.* not common. Switzerl. Sweden: M. Huss. France; Le Jolis. *Amer.* r. Can.: Macoun.

B. Capsule not strangulate; teeth yellow; annulus us. present. Leaves more or less distant; cells narrow or not much dilated.

a. Shoot-leaves and lower leaves of fruiting stem distant narrowly long-decurrent. Leaves finally red. Tufts dense.

176. **B. columbicum** Kindb. — Webera cat. Can. m.

Leaves sublinear-lanceolate long-acuminate serrate reflexed; cells narrow; costa red subpercurrent. Capsule red or red-yellow broad-oval or subglobose; annulus broad; cilia in pairs. — Moist banks r. *Amer.* Can.: Macoun.

b. Leaves not distinctly decurrent us. green. Tufts us. loose.

aa. Capsule more or less distinctly annulate.

177. **B. pulchellum** Hedwig. — Webera Schimper, in part.

Capsule subglobose or oval red-yellow or finally brown-red; neck shortish. Leaves ovate-lanceolate acuminate: upper denticulate faintly reflexed; cells narrow; costa green not excurrent. — Earth in northern distr. *Eur.* Norway!; E. Nyman. Finl.: Brotherus. Sweden not r.: P. Olsson. *Amer.* r. Can.: Macoun.

178. **B. lutescens** Limpricht. — Webera Limpr.; Bryum Kindb.

Differs from the last: Capsule suboval paler; neck us. longish. Leaves more distinctly serrate and distant; costa red, in comal leaves sometimes excurrent. Tufts less loose. — Earth also in alps r. *Eur.* Norway!

179. **B. Lescurii** Sullivan ic. musc. — Webera Lesq. et Jam.

Differs from *B. pulchellum*: Annulus broader, wholly revoluble. Leaves longer: lower less distant, upper more subulate not reflexed; cells wider. — Wet clay soil r. *Amer.* Can.: Macoun. U. S.: Sullivan and Austin, com. Mrs Britton.

bb. Capsule not annulate.

180. **B. Drummondii** C. Mueller. — Mniobryum vexans Limpr.

Capsule sometimes larger than in *B. pulchellum*. Differs also from it: Leaves erect distinctly reflexed and serrate; cells wider; costa finally red below. — Earth also in alps r. *Eur.* »Germany»: Limpricht. *Amer.* Can.: Drummond n. 261, com. Macoun.

4. Cucullatiformia.

A. Leaves very distant, us. broadly long-decurrent; cells gen. very wide.

181. **B. Ludwigii** Sprengel. — Webera Broidleri Juratzka.

Leaves gen. ovate or suboblong obtusate, us. entire and large. Capsule suboval. Tufts loose finally red. Dioecious. — Wet siliceous ground princ. in alps. *Eur.* less r. Norway! Austria: Breidler. *Amer.* r. Can. Brit. Col.: Macoun. U. S.: Henderson, com. Cardot.

* **B. grande** Kindb. n. subsp. — Webera Ludwigii var. latifolia Schimp.

Leaves still larger and broader, round-ovate gen. quite entire and green, less distinctly decurrent; cells rhombic wider. Stem very high. Capsules unknown. — Alp. region r. *Eur.* Norway! 182. **B. Bigelowii** Sullivant. — Webera Ludwigii var. microphylla Kindb. cat. Canad. m.

Differs from *W. Ludwigii*: Leaves small; cells narrower; costa shorter. — Wet alp. rocks r. *Amer.* Can. Brit. Col.: Macoun.

B. Leaves crowded or not much distant, not or shortly decurrent; cells rhomboidal not much wide.

a. Paroecious. Leaves obtusate gen. obtuse, at least the lower and the perichetial.

183. **B. cucullatum** Schwægrichen. — Webera Schimper.

Leaves oval-ovate not decurrent. Capsule oval-oblong yellowish brown; lid mamillate; cilia smooth; endostomial membrane very low. Tufts dense. — Moist alp. places. *Eur.* less r. Norway! E. Nyman. Austria: Breidler. *Amer.* r. Greenl.: Berggren. Can.: Gremann, com. Cardot. U. S.: Henderson, com. Cardot. 184. **B. cucullatiforme** Kindb. n. sp.

Differs from the last: Leaves subdecurrent smaller, appressed when dry; upper gen. acute. Capsule smaller and more constricted; cilia sometimes appendiculate. — Arctic distr. r. *Amer.* Alaska: J. M. Macoun.

b. Dioecious. Leaves acute, at least the perichetial.

aa. Leaves crowded not decurrent. Endostomial membrane very low; cilia short rudimentary; lid mamillate.

185. **B. polymorphoides** Kindb. — Webera cat. Canad. m.

Leaves ovate-oblong acute or subobtuse; costa not excurrent, in the longer and narrower perichetial sometimes excurrent. Capsule oblong yellowish brown; teeth pale; pedicel about 2 c. m. long. Tufts dense 4–5 c. m. high rufescent below. — Higher alp. region r. *Amer.* Can. Brit. Col. 2250 metr. a. sea: J. M. Macoun.

bb. Leaves more or less distant and decurrent. Endostomial membrane elevate; cilia long; lid conic,

186. **B. commutatum** Schimper. — Webera Sch.; Bryum Boulay.

Leaves oval-ovate or suboblong us. short-acuminate and erect when dry. Perichetial leaves oblong-lanceolate more distinctly denticulate. Capsule suboval dark or blackish brown. — On earth in alps. *Eur.* not uncommon. Norway! *Finl.*: Brotherus. France: Husnot. *Amer.* Greenl.: Berggren. Can.: Macoun.

* **B. microdontium** Kindb. — Webera microdenticulata C. M. et Kindb. cat. Can. m.

Leaves more glossy, patent when dry; perichetial somewhat longer. Tufts looser. — Higher alp. region r. *Amer.* Can. Brit. Col. 2100 metr. a. sea: Macoun.

* **B. gracile** Schleicher. — Webera Notaris.

Leaves smaller narrower more acuminate, appressed when dry. Capsule narrower sometimes reddish. Stem often with us. red bulbili. — Alps r. *Eur.* Norway, Switzerl. Austria: Venturi. *Amer.* Can.: Macoun.

* **B. subcucullatum** C. M. et Kindb. — Webera cat. Can. m.

Leaves small suboblong gen. obtusate, appressed when dry; lower obtuse. Capsule smaller. Stem without bulb. Tufts dense. — Higher alp. region r. *Amer.* Can. 2100 metr. a. sea: Macoun.

* **B. Cardoti** Renauld. — Webera Ren.; Bryum Kindb.

Lower leaves often subobtusate. Capsule sometimes erect when moist, sometimes pendent when dry. — *Amer.* r. U. S. Oregon: Henderson, com. Cardot.

* **B. filum** Schimper.

Leaves not reflexed, often subobtusate, more distant or less distinctly crowded; cells wider. Tufts high often loose. Capsules unknown. — Alps r. *Eur.* Norway! Switzerl.: Culmann, com. Husnot.

* **B. carinatum** Boulay. — »Webera cucullata var.«: Husnot.

Leaves carinate not reflexed nearly appressed, very glossy. Capsule thick; pedicel short. — Rocks r. *Eur.* Mont Blanc: Payot, com. Husnot.

* **B. Payoti** Schimper. — »Bryum Blindii var.«: Husnot.

»Leaves broad-ovate long-decurrent nearly entire, imbricate when dry. Tufts 4—6 c. m. high not tomentose. Capsules unknown. — Alp. rivulets r. *Eur.* France: Payot»: Limpricht.

187. **B. microsporum** Kindb. — Webera pycnodecurrans C. M.

et Kindb. cat. Can. m.

Differs from *B. commutatum*: Leaves distinctly serrate longer-decurrent, more glossy and finally reddish, patent when dry;

cells narrower. Capsule reddish yellow; cilia sometimes sub-appendiculate. Spores very small. — Alps r. *Amer.* Brit. Col. 2100 metr. a. sea: Macoun.

188. *B. canadense* Kindb. — *Webera micro-apiculata* C. M. et Kindb. cat. Can. m.

Leaves small suboblong or oblong-lanceolate apiculate or narrowed to a short gen. entire acumen, finally red, appressed when dry; the uppermost denticulate faintly reflexed; cells very narrow; costa faint, vanishing far below apex. Tufts dense not high, green above, reddish below. Capsules unknown. — Rocks r. *Amer.* Can. Brit. Col.: Macoun.

189. *B. norvegicum* Kindb. — *B. micro-commutatum* Kindb. botan. notiser 1896.

Leaves small oval-ovate obtusate or short-acuminate faintly denticulate nearly crowded and gen. not decurrent; cells not wide; costa not excurrent. Tufts low green. Differs from *B. commutatum*: Capsule subglobose or broad-piriform purplish or finally dark brown-red, often erect; neck very short; teeth brown-yellow; pedicel us. shortish. — In alp. region r. *Eur.* Norway Dovrefjeld and Tronfjeld!

5. Albicantiformia.

190. *B. albicans* Wahlenberg. — *Mniobryum* Limpr.

Leaves not glossy, often glaucous green sometimes finally red; cells rhomboidal; costa not percurrent. Lower leaves ovate or ovate-oblong; upper acute not reflexed, distant short-decurrent, us. narrowly ovate-lanceolate. Capsule glaucous finally reddish or orange-brown, blackish when old, thick piriform; neck thick; teeth orange; lid mamillate; pedicel long. Tufts loose often high when sterile, about 2—3 c. m. when fruiting. Dioecious. — Wet places princ. in alps. *Eur.* common in alps. Sweden, Norway, Switzerl. *Amer.* Can.: J. Macoun; Moser. Alaska: J. M. Macoun. U. S.: Henderson, com. Cardot.

* *B. sparsum* »Hampe»: C. Mueller.

Leaves smaller; cells narrower. Stem short. — *Amer.* r. U. S.: Roell; Bolander, com. C. Mueller.

VI. Epipterygium Lindberg.

191. *B. Tozeri* Greville. — *Webera* Schimper.

Leaves pale green; the larger oval or obovate abruptly short-acuminate acute decurrent; inner cells wide rhomboidal. Smaller leaves oblong. Capsule small obovate rufescent; neck short; lid conic; annulus very broad; pedicel not long. Stems short not tufted. Dioecious. Habit of *B. carneum*. — Wet earth r.

Eur. France: Philibert; Du Noday. *Engl.*: Curnow. *Amer. Pacif.* distr. *Can.*: Macoun. *U. S.*: Henderson, com. Cardot.

VII. *Pohlia* Hedwig, in part.

A. Capsule large narrowly oblong. Upper leaves narrowly ovate-lanceolate distinctly reflexed. Tufts loose.

192. ***B. elongatum*** Hedwig. — *Pohlia* H.; *Bryum* Dickson.

Upper leaves sharply acuminate more or less denticulate. Capsule not pendent, with us. curved longer neck; lid r. rostellate; pedicel long. *Us.* paroecious. — Earth and rocks princ. below alp. regions. *Eur.* not r. Norway! Sweden: E. Adlerz.

* ***B. ambiguum*** Limpricht. — *Webera* Limpr.; *Bryum* Kindb.

»Leaves denticulate only near apex: upper suddenly larger. Cilia split. — *Eur.* r. Austria: Limpricht.

* ***B. acuminatum*** Hornschuch. — *Pohlia* Hsch.; *Bryum* Br. eur.

Leaves denticulate near apex: upper often suddenly larger. Capsule not shorter than the us. straight neck; lid often rostellate. — Earth and rocks princ. in alps. *Eur.* Norway, Switzerland! Sweden: H. Nordenstroem. *Scotl.* Rogers. *Amer. Can.*: Macoun; Fowler.

B. Capsule not large, suboblong or subobovate. Upper leaves faintly reflexed, broadly ovate-lanceolate. Tufts dense.

193. ***B. polymorphum*** Hoppe et Hornschuch. — *Pohlia* Hop. et Hsch.; *Bryum* Br. eur.

Capsule gen. suboblong and pendent; neck shorter, r. curved; lid not rostellate; pedicel us. short. Leaves crowded us. appressed when dry; cells very narrow. Stem us. naked below or beset with very small leaves. Tufts low. *Us.* paroecious. — Earth and rocks in alp. regions. *Eur.* not r. Norway, Switzerland! France: Husnot. *Amer.* r. Greenl.: Berggren; Vanhoeffen.

* ***B. brachycarpum*** Hoppe et Hornschuch. — *Pohlia* Hop. et Hsch.; *Bryum* Kindb.; *B. nudicaule* Lesquereux; Sullivan icon. m.; *Webera microcaulon* C. M. et Kindb. cat. *Can.* m.

Capsule thick subobovate. *Us.* monoecious. — Alp. rocks r. *Eur.* Norway! France: Husnot. *Amer. Can.*: J. Macoun; Alaska: J. M. Macoun. *U. S.*: Bolander, com. C. Mueller.

* ***B. pseud-acuminatum*** Kindb. n. subsp.

Capsule larger, suboblong and gen. not pendent. Stem and pedicel longer. *Us.* monoecious or dioecious. — Alp. rocks r. *Eur.* Norway!

194. ***B. subpolymorphum*** Kindb. n. sp.

Capsule oblong pendent, smaller than in *B. polymorphum*;

neck shorter; lid rostellate. Leaves less crowded and not appressed when dry, sometimes subdecurent; cells wider. Stem uniformly foliate, not naked below. Dioecious. — Alp. regions r. *Amer.* Can. Brit. Col. 1950 metr. a. sea: Macoun Canad. musci n. 468.

156. **Leptotheca** Schwægrichen.

1. **L. Wrightii** Sullivant.

»Comal leaves oblong-obovate or obovate-spathulate, narrowly margined, recurved, serrulate above; costa excurrent. Capsule erect cylindric; endostome rudimentary. Tufts low dense tomentose. Pseudo-monoecious. — *Amer.* r. U. S. Florida: Lesq. et Jam.

Fam. 33. **Buxbaumiaceæ.**

157. **Buxbaumia** Haller; L.

1. **B. aphylla** L.

Capsule brown, depressed on upper side with thick border and persistent cuticle; teeth short in a single row. — Bare earth esp. in fir-woods or on decayed wood. *Eur.* not r. Sweden! Austria: Schmid. France: Brébisson. *Amer.* r. Can.: Macoun.

2. **B. indusiata** Bridel.

Capsule green neither depressed nor margined; cuticle splitting; teeth in 4 rows, each row increasing in length. — Rotten logs. *Eur.* not r. Sweden! France: Husnot. *Amer.* r. Can.: Macoun.

158. **Diphyscium** Ehrhart; Mohr.

1. **D. sessile** Schmid. — *Buxbaumia* Schmid; *Diphyscium* Lindb.; *D. foliosum* Mohr.

Leaves small linear-lingulate, curled when dry; upper cells rotundate, lower oval-oblong, outer basal linear pellucid; costa not percurrent. Perichetial leaves very large not chlorophyllose, from ovate-oblong base long-acuminate ciliate near apex; costa excurrent to a long rough hairpoint. Capsule large ovoid small-mouthed often curved; endostome white. Dioecious. — Earth and rocks. *Eur.* not r. Switzerl.! *Amer.* Can.: Macoun.

Fam. 34. **Andreæaceæ.**

159. **Andreæa** Ehrhart.

A. Leaves nerveless us. appressed when dry.

1. **Petrophilæ.** Leaves more or less papillose. Us. monoecious.

B. Leaves costate, not appressed when dry, often falcate.

2. **Nivales.** Leaves papillose, crisped or flexuous when dry; the perichetial costate. Dioecious, r. fruiting.

3. **Rupestres.** Leaves smooth or (sometimes in *A. frigida*) faintly mamilllose, not crisped: inner perichetial convolute and (exc. *A. Rothii*) nerveless. Monoecious.

1. **Petrophilæ.**

A. Leaves broader above base, somewhat large; perichetial obtusate. Stem often longish.

a. Leaves slightly crenulate at base; cells small.

1.**A.alpina** L. — Jungermania L.; Andreaea Smith.

Leaves short-acuminate obtuse crowded nearly smooth, us. appressed when dry. Tufts blackish; stem erect not much high. — Rocks near Atlantic sea r. *Eur.* Norway! R. Hartman; F. Kær.

b. Leaves entire; cells somewhat large.

2.**A.Hartmani** Schimper.

Leaves large gen. obtusate and distant, nearly smooth and not appressed. Tufts brownish. Stem us. very long and floating. — Stones in rivulets in northern alps r. *Eur.* Norway! Sweden: K. F. Thedenius.

* **A.Thedenii** Schimper.

Leaves less large and more distinctly acuminate, crowded, faintly papillose, often appressed. Tufts blackish brown; stem erect not much high. — Wet rocks in northern alps r. *Eur.* Norway!

3.**A.obovata** Thedenius.

Leaves less large gen. long-acuminate, crowded, distinctly papillose and appressed, reddish or brown-red when moist. Tufts blackish when dry; stem erect not much high. — Wet rocks in northern alps r. *Eur.* Norway! Sweden: R. Hartman. Finl.: Brotherus. *Amer.* Greenl.: Berggren.

B. Leaves broader near base, gen. small and appressed when dry; perichetial sometimes acuminate. Tufts loose; stem erect.

4.**A.petrophila** Ehrhart.

Leaves ovate oblong or ovate-lanceolate acuminate gen. sub-obtuse distinctly papillose and crowded; inner perichetial us. obtusate. Tufts gen. brown and low. — Siliceous rocks common. *Eur.* Sweden, Norway, Switzerl.! Spain: Levier. *Amer.* Can.: Macoun; Waghorne.

* **A. alpestris** Thedenius.

Leaves smaller and less papillose, short-acuminate obtuse; cells smaller. Perichetial leaves obtusate obtuse. Stem thinner. Tufts us. blackish. — Northern alps r. *Eur.* Norway! *Amer.* Can.: Macoun.

* **A. papillosa** Lindberg.

Leaves very papillose often nearly subulate-acuminate; cells somewhat large. Perichetial leaves acute short-acuminate. Tufts often high and blackish. — Princ. in arctic distr. r. *Eur.* Norway! Spetsbergen: Berggren. *Amer.* »Greenl.»: Lange:

* **A. subsparisifolia** Kindb. n. subsp.

Leaves gen. long-acuminate: perichetial acute acuminate; cells not large. Tufts brown somewhat high. — *Eur.* r. Norway on rocks near Atlantic sea in Oerkedall.

* **A. tenella** Kindb. n. subsp.

Leaves narrow long-acuminate often crenulate above, very small; cells small as in *A. alpestris*. Stem capillary. Tufts low blackish. — Alp. region r. *Eur.* Spain hospice de Vénasque in Pyren. mts 1800 metr. a. seal

* **A. sparsifolia** Zetterstedt.

Leaves distant gen. long-acuminate acute, also the perichetial. Tufts sometimes olive-green, often somewhat high. — In alps r. *Eur.* Norway: Bryhn. Sweden: E. Nyman.

* **A. sublævis** Kindb. note on Can. bryol. 1893 (as var.).

Leaves small distant spreading gen. nearly smooth: perichetial gen. acute long-acuminate. Tufts low blackish brown. — *Amer.* r. Can. Vanc. isl.: J. M. Macoun.

5. **A. parvifolia** C. Mueller in Flora 1887.

»Plant very small. Leaves minute from oval biventricose base narrowed to a suboblong round-obtuse acumen, very papillose: perichetial subobtusate or acuminate. Capsule minute; pedicel very short. Dioecious. — Arctic distr. r. *Amer.* Alaska»: C. M.

2. Nivales.

A. Leaves papillose on whole lamina, not densely crowded, more or less crisped. Tufts loose and high when sterile.

6. **A. nivalis** Hooker.

Leaves ovate-lanceolate gradually narrowed to the subulate acumen, papillose princ. at borders; costa not or slightly excurrent. Tufts us. blackish or black-red when dry. — Wet sand on alp. often inundated rocks r. *Eur.* Norway! Sweden: E. Adlerz. France: Zetterstedt. Austria: Husnot m. Gall.

7. A. Macounii Kindb. bull. Torr. club 1890.

Leaves from short ovate or broadly ovate-lanceolate base abruptly narrowed to the sublinear acumen, papillose princ. on upper part of costa, which is purple red gen. long-excurrent but not filling whole acumen below. Tufts brown or brown-red when dry. Capsules unknown. — On inclined faces of rocks by rivulets in higher alp. region r. *Amer.* Can. Brit. Col. 2250 metr. a. sea: J. Macoun. U. S. Oregon: Roell.

B. Leaves smooth on lamina, papillose on the long-excurrent costa, crowded, slightly crisped. Tufts low dense.

8. A. Blyttii Schimper.

Leaves from short ovate base abruptly narrowed to the excurrent costa. Tufts us. blackish when dry. — Northern alps r. *Eur.* Norway: M. N. Blytt; Zetterstedt. *Amer.* Greenl.: Berggren, com. Nathorst.

3. Rupestres.

A. Leaves with not or slightly excurrent costa; the inner perichetial with percurrent costa.

9. A. Rothii Weber et Mohr.

Leaves crowded us. ovate-lanceolate broadly acuminate subacute and not falcate. Tufts low dense blackish or red-brown. — Siliceous rocks. *Eur.* not r. Norway! Sweden!; R. Hartman. France: Husnot. *Amer.* r. »U. S.«: Lesq. et Jam.

* **A. falcata** Schimper.

Leaves falcate smaller, from ovate-oblong base abruptly narrowed to the subulate acumen. Tufts us. blackish. — Alp. rocks r. *Eur.* Spain, Switzerl.! France: Husnot. *Amer.* Can.: Macoun.

B. Leaves gen. with long-excurrent costa: inner perichetial nerveless.

a. Leaves short ovate or ovate-oblong crowded often suberect when dry: perichetial us. smooth.

10. A. crassinervis Bruch.

Leaves subovate; costa thick terete long-excurrent. Inner perichetial leaves long-acuminate, outer costate. Tufts dense blackish. — Rocks princ. below alps near sea. *Eur.* Sweden less r.l.; M. Huss. Norway: E. Nyman. Finl.: Axel Arrhenius. *Amer.* r. N. Foundl.: Waghorne.

11. A. obtusifolia Berggren in sched.

Leaves ovate-oblong; costa faint applanate excurrent not filling whole acumen below. Nearly all perichetial leaves nerveless: inner obtusate or short-acuminate. Tufts loose blackish.

— Dry siliceous rocks in arctic distr. r. *Amer.* Greenl.: Berggren, com. Nathorst.

b. Leaves gen. ovate-lanceolate patent also when dry.

aa. Leaves somewhat distant: inner perichetial very papillose.

12. **A. Huntii** Limpricht.

Leaves falcate; costa not filling whole acumen below. Tufts dense blackish. — Rocks princ. in lower districts r. *Eur.* Sweden: C. Indebetou. Norway: E. Nyman. Engl.: Holt. Portugal: Levier. *Amer.* Can. Vanc. isl.: Macoun.

bb. Leaves crowded; the perichetial smooth.

13. **A. frigida** Huebener.

Leaves broadly acuminate subobtus; outer perichetial costate. Tufts dense reddish brown or blackish. — Siliceous alp. rocks. *Eur.* not r. Spain! Portugal and Corsica: Levier. Germany: Limpricht. Austria: Breidler.

14. **A. angustata** Lindberg.

Leaves narrowly long-acuminate subacute: perichetial nerveless. Tufts loose blackish very low. — In alp. region r. *Eur.* »Austria 1600 metr. a. sea: Breidler»: Limpricht.

Fam. 35. **Bruchiaceæ.**

160. **Bruchia** Schwægrichen.

A. Calyptra hispid. Capsule with nearly indistinct neck.

I. **Trachymitra**. Capsule wholly immersed; pedicel very short. Upper leaves long-acuminate subovate-lanceolate; costa percurrent. Spores nearly smooth about 0,03 m. m. Monoecious.

B. Calyptra glabrous. Capsule gen. distinctly necked.

II. **Pseudo-Trematodon**. Capsule with narrow often defluent neck; pedicel gen. long-exserted above the upper leaves. Spores about 0,02 m. m., more or less papillose. Us. monoecious.

III. **Eu-Bruchia**. Capsule with gen. thick (not defluent) and not longer neck; pedicel short-exserted or immersed. Paroecious or (*B. Drummondii*) monoecious, r. dioecious.

I. **Trachymitra** Kindb.

1. **B. Ravenelii** Wilson; Sullivant icon. musc.

Upper leaves nearly gradually acuminate; costa nearly filling upper part of the serrulate acumen. — *Amer.* r. »U. S.»: Sullivant.

2. **B. Carolineæ** Austin; Britton in contrib. from Columbia coll.

Upper leaves gen. from subobovate base abruptly acuminate; costa broadly bordered by lamina of the nearly entire acumen. — *Amer.* r. »U. S.»: Austin»: Britton.

II. Pseudo-Trematodon Kindb.

A. Upper leaves slightly sinuolate above; costa not excurrent.
3. **B. Bolanderi** Lesquereux; Sullivant icon. m.

Upper leaves ovate-lanceolate nearly gradually narrowed. Capsule shorter than the not defluent neck; pedicel longer. — *Amer. r. »U. S.»*: Sullivant.

B. Upper leaves us. entire r. denticulate; costa excurrent.
4. **B. longicollis** Eaton bull. Torr. club 1890.

Upper leaves ovate-lanceolate nearly gradually narrowed; costa filling upper half of acumen. Capsule shorter than the defluent neck; pedicel long-exserted. — *Amer. r. »U. S.»*: Eaton.

5. **B. trobasiana** Notaris.

Upper leaves subovate-lanceolate gradually narrowed, costa not filling whole acumen below. Capsule not shorter than the subdefluent neck; pedicel scarcely exerted above upper leaves. Sometimes paroecious. — *Eur. r. Austria*: Breidler, com. Warnstorf.

6. **B. vogesiaca** Schwægrichen.

Upper leaves ovate-oblong abruptly narrowed to a by costa filled acumen. Capsule not shorter than the defluent neck; pedicel long-exserted. — *Eur. r. France*: Boulay; Buchinger.

III. Eu-Bruchia.

A. Costa of leaves excurrent.

7. **B. curviseta** Lesquereux et James.

»Upper leaves subovate, denticulate above. Capsule wholly exerted, longer than the thick neck; pedicel curved or geniculate, not shorter. Spores papillose. Paroecious. — *Amer. U. S.»*: Lesq. et Jam.

8. **B. Drummondii** Hampe. — *B. brevipes* Sull. l. c. (non Hooker).

Upper leaves entire from subovate base abruptly narrowed to the subulate by costa nearly wholly filled acumen. Capsule wholly immersed; pedicel short. Spores less papillose. Monoecious. — *Amer. r. »U. S.»*: Sullivant.

B. Costa of leaves not excurrent.

a. Leaves short obtusate or short-acuminate.

9. **B. brevifolia** Sullivant icon. muse.

Upper leaves from longer, ovate-oblong base nearly gradually narrowed to the short acumen; costa percurrent. Capsule partly emergent; pedicel very short. Spores nearly smooth somewhat small. — *Amer. r. »U. S.»*: Sullivant.

10. **B. fusca** Britton l. c.

Upper leaves ovate or broad-ovate obtusate or very short-

acuminate, often obtuse; costa abbreviate or scarcely percurrent. Capsule exserted; pedicel nearly immersed. Spores as in the last. — *Amer. r.* »U. S.«: Mrs Britton.

11. *B. Hallii* Austin; Britton l. c.

Upper leaves subovate very short-acuminate acute; costa percurrent. Capsule wholly exserted; pedicel nearly emergent at apex. Spores large papillose. — *Amer. r.* »U. S.«: Mrs E. G. Britton.

b. Leaves long-acuminate. Spores somewhat large, us. very papillose.

12. *B. texana* Austin; Britton l. c. — *B. flexuosa* var. *nigricans* Sull. l. c.

Upper leaves from ovate-oblong base abruptly subulate-acuminate, entire. Capsule wholly exserted, longer than the thick neck; pedicel subemergent. — *Amer. U. S.*: com. Macoun.

* *B. Donnellii* Austin; Lesq. et Jam.

»Leaves sinuate above, sometimes faintly papillose. Pedicel often emergent. — *Amer. r. U. S.*: Lesq. et Jam.

* *B. Sullivantii* Austin; Lesq. et Jam. — *B. flexuosa* Sull. l. c. in part.

Capsule partly emergent. Spores larger, more papillose. — *Amer. r.* »U. S.«: Sullivant.

13. *B. flexuosa* Schwægrichen. — *Phascum* Schw.; *Bruchia* C. M.; *B. Beyrichiana* Sull. l. c.

Upper leaves from ovate-oblong base nearly gradually narrowed to the linear-subulate by the (not excurrent) costa nearly filled acumen. Capsule oval piriform without distinct neck, partly emergent; pedicel not shorter. — *Amer. r. U. S.*: Langlois, com. Cardot.

161. *Pleuridium* Bridel.

A. Monoecious with gemmiform male flowers.

a. Branches julaceous. Leaves obtusate or short-acuminate; upper cells small rhomboidal.

1. *P. Sullivantii* Austin. — »*P. nervosum*» Sull. icon. m., non Brid.

Leaves subovate crowded: upper with thick excurrent costa, perichetial abruptly acuminate much larger. Capsule broad-oval thick-pointed; pedicel nearly half as long. — *Amer. r.* »U. S.«: Sullivant.

b. Branches not julaceous. Leaves long-acuminate; the upper larger; cells rectangular.

2. *P. alternifolium* Dickson. — *Phascum* Dicks.; *Pleuridium* Rabenhorst.

Upper leaves somewhat abruptly subulate gen. serrulate above; costa sometimes excurrent. Capsule subovoid with straight point. Tufts green. — *Eur.* not r. in northern distr. Sweden! France: Lamy. Finl.: Bomansson. *Amer.* U. S.: Howe; Sullivant, com. C. Mueller.

3. *P. Bolanderi* C. Mueller.

Upper leaves gradually subulate nearly entire, shorter than in the last; costa excurrent. Capsule ovoid with oblique point. Tufts dark green. — *Amer.* r. U. S. Chicago: Roell.

B. Paroecious or synoecious.

a. Upper leaves not larger than the lower.

4. *P. axillare* Dickson. — *Phascum* Dicks.; *Pleuridium* Lindb.; *P. nitidum* Rabenhorst.

Leaves narrowly ovate-lanceolate acute; costa faint not excurrent. Capsule ovoid often lateral. — *Eur.* not r. Sweden! Engl.: Rogers. Austria: Schmidt.

b. Upper leaves larger than the lower.

5. *P. palustre* Br. eur. — *Phascum* Br. eur.; *Pleuridium* Husnot.

Leaves crowded: upper ovate-oblong; costa long-excurrent. Calyptra mitriform. Capsule round-ovoid; pedicel very short. Protonema often persistent. — Wet earth. *Eur.* not common. Sweden: S. Berggren; J. Persson. Belgium: Gravet. *Amer.* »U. S.»: Lesq. et Jam.

6. *P. subulatum* Hudson. — *Phascum* Huds.; *Pleuridium* Rabenhorst.

Leaves gen. distant; the upper from ovate-oblong base nearly gradually subulate; costa not well-defined above and scarcely excurrent. Calyptra cucullate. Capsule ovoid apiculate; pedicel us. very short. Protonema not persistent. — Sandy soil. *Eur.* princ. in southern distr., r. in northern. Switzerl. Sweden: M. Huss. Engl.: Whitehead. France: Husnot. *Amer.* »U. S.»: Lq. et J.

*** *P. anomalum* Kindb.** in nuovo giorn. bot. ital. 1893 (as var.).

Capsule with distinct lid; pedicel arcuate emergent above leaves. — On sand at a stonewall, mixed with *P. subulatum* and *Ditrichum pallidum* (hybride form?). *Eur.* Switzerl. near Luganol

*** *P. astomoides* Limpricht.**

»Hybride form? Capsule without distinct lid, shorter than the straight not emergent pedicel. — Mixed with *P. subulatum* and *Ditrichum pallidum*. *Eur.* Austria; Breidler: Limpricht.

7. *P. Ravenelii* Austin.

»Differs from *P. subulatum*: Upper leaves with longer sub-lanceolate base; costa excurrent. Capsule broadly apiculate, a little larger. — Light sandy soil r. *Amer. U. S.*: Lesq. et Jam.

162. *Archidium* Bridel.

A. Monoecious with male flowers on separate branches. Leaf-cells subrectangular.

1. *A. ohioense* Schimper; Sullivant icon. musc.

Leaves distant patent sublinear-subulate serrulate above; the perichetial from ovate base abruptly acuminate; costa gen. not excurrent. — Clay soil r. *Amer. Can.*: Macoun.

2. *A. Hallii* Austin.

Leaves crowded suberect sublinear-subulate nearly entire; costa sometimes excurrent. Perichetial leaves not seen. — *Amer. r. U. S.*: Henry, com. Cardot.

B. Synoecious or subparoecious (submonoecious).

3. *A. alternifolium* Hooker et Taylor. — Phascum H. T.; *Archidium* Schimper; *A. phascoides* Brid.

Leaves distant patent sublinear-subulate gen. entire; cells sub-rectangular; perichetial leaves from ovate-oblong base abruptly acuminate; costa sometimes excurrent. Stem with numerous flagelliform shoots. Habit of *Pleuridium alternifolium*. — Wet soil viz. near lakes r. *Eur. Sweden*: France: Berthoumieu.

4. *A. longifolium* Lesquereux et James.

»Synoecious. Leaves narrowly lanceolate-subulate; cells gen. rectangular; costa excurrent. — *Amer. r. U. S.*: Lesq. et Jam.

5. *A. tenerrimum* Mitten.

»Differs from *B. ohioense*: Subparoecious. Leaf-cells much shorter and closer. — *Amer. r. U. S.*: Drummond»: Lesq. et Jam.

6. *A. Ravenelii* Austin.

»Synoecious. Lower leaves ovate, upper ovate-lanceolate or acute or obtuse entire; cells round-oval or rhomboidal; costa sometimes excurrent. — *Amer. r. U. S.*: Lesq. et Jam.

163. *Ephemerum* Hampe.

1. *Ecostata*. Leaves nerveless (r. faintly costate in upper half.).

2. *Costata*. Leaves costate. Spores papillose.

1. *Ecostata*.

A. Leaves serrate above middle; cells wide.

1. *E. serratum* Schreber. — Phascum Schr.; *Ephemerum* Hampe.

Leaves narrowly suboblong not long-acuminate. Spores pa-

pillose 0,05—0,07 m. m. — *Eur.* not r. Sweden: Hamnström. Austria: Schmidt. France: Berthoumieu. *Amer.* »U. S.»: Lesq. et Jam.

* **E. præcox** Walther et Molendo. — *E. intermedium* Mitten.

Leaves faintly costate in upper half. — *Eur.* r. »Engl.»: Braithwaite.

2 **E. minutissimum** Lindberg.

Leaves narrowly lanceolate long-acuminate. Spores nearly smooth smaller than in the last. — *Eur.* r. »Engl.»: Braithwaite. *Amer.* Can.: Macoun; Drummond n. 10.

B. Leaves nearly entire; upper cells narrow.

3 **E. stellatum** Philibert.

Leaves from subovate base abruptly narrowed to a long subulate acumen. Spores smooth 0,04—0,05 m. m. — *Eur.* r. France: Philibert.

2. Costata.

A. Leaves from broader base gradually subulate.

a. Leaves nearly entire. Calyptra campanulate.

4 **E. sessile** Br. eur. — *Phascum* Br. eur.; *Ephemerum* C. M.; *E. stenophyllum* Schimper; Braithwaite.

Leaves with long-excurrent costa; cells somewhat narrow nearly uniform. Capsule sessile; columella rudimentary. Spores 0,06—0,08 m. m. — *Eur.* r. France: Camus; Philibert. *Amer.* »U. S.»: Lesq. et Jam.

b. Leaves serrulate nearly all around. Calyptra subcucullate split at one side.

5 **E. crassinerve** Schwægrichen.

Leaves with smooth not excurrent costa; cells rectangular nearly uniform. Capsule very short-pedicellate; columella complete. — Described to figures in *icones muscorum* by Sullivan; his own description not in agreeing. — Moist clay ground. *Amer.* »U. S. common»: Lesq. et Jam.

6 **E. spinulosum** Bruch et Schimper.

»Differs from the last in leaves narrower; costa excurrent into a long hyaline spinulose arista. — *Amer.* Same locality as the preceding»: Lesq. et Jam.

B. Leaves from long base abruptly narrowed to a shorter often deflexed acumen, more or less serrate above middle.

a. Calyptra cucullate. Costa of leaves excurrent.

7 **E. recurvifolium** Dickson. — *Phascum* Dicks.; *Ephemerum* Boulay; *Ephemerella* Schimper; *E. pachycarpa* C. M.

Leaves sublinear-lanceolate often somewhat long-acuminate,

sometimes falcate when moist; cells subrectangular or the upper shorter. Spores about 0,04 m. m. — *Eur. r.* France: Brébisson.

b. Calyptra campanulate. Costa of leaves faint gen. not excurrent.

8. **E. coherens** Hedwig. — *Phascum* Hedw.; *Ephemerum* Hampe.

Leaves suboblong short-acuminate; cells irregular: upper rhombic. Spores 0,05—0,07 m. m. — *Eur. r.* Austria: Breidler. *Amer. »U. S. common»:* Lesq. et Jam.

* **E. Flotowii** Funck. — *Phascum* Funck; *Ephemerum* Limpr.

Leaves sublanceolate somewhat long-acuminate, often nearly entire. — *Eur. r.* Germany»: Schimper.

9 **E. Ruthel** Schimper; Husnot m. Gall.

Leaves sublinear-lanceolate long-acuminate; cells nearly uniform. Spores about 0,05 m. m. — *Eur. r.* »Germany»: Schimper.

164. **Nanomitrium** Lindberg.

1. **N. tenerum** Bruch. — *Phascum* Bruch; *Nanomitrium* Lindb.; *Micromitrium* megalosporum Austin; Sulliv. icon. m.; *Ephemerum* longifolium Philibert.

Leaves narrowly ovate-lanceolate faintly serrulate nearly all around, suberect when moist. Capsule with hyaline walls and very short subacute point, sometimes transversely splitting when pressed. Spores faintly papillose about 0,03 m. m. — *Eur. r.* France: Thériot; Philibert. *Amer. »U. S.»:* Sullivant.

2. **N. Austini** Sullivant. — *Ephemerum* Sulliv.; *Nanomitrium* Ren. et Card.; Kindb. revue bryol. 1895; *Micromitrium* Austin; Sull. icon. muse.

Differs from the last: Leaves longer-acuminate, more subulate, entire below middle, spreading or deflexed when moist; cells of capsule larger, not hyaline; spores smaller scarcely 0,03 m. m. nearly smooth. — *Amer. r.* »U. S.»: Sulliv.

3. **N. synoicum** James. — *Ephemerum* Jam.; *Nanomitrium* Ren. et Card.; Kindb. l. c.; *Micromitrium* Austin; Sull. icon. muse.

Leaves narrowly ovate lanceolate long-acuminate subulate entire, suberect when moist. Capsule neither apiculate nor regularly splitting; cells as in the last. Spores about 0,02 m. m., distinctly papillose. — *Amer. r.* »U. S.»: Sulliv.

165. **Ephemeridium** Kindb. revue bryol. 1895.

1. **E. papillosum** Austin. — *Ephemerum* Aust.; Sullivant icon. muse.; *Ephemeridium* Kindb. l. c.

Leaves long narrowly ovate-lanceolate, tapering above middle to the subulate acumen, sharply serrate nearly all around, suberect when moist; cells rectangular nearly uniform; costa per-

current serrate at back. Capsule subapiculate; cells small; calyptra covering half capsule, laciniate. Spores about 0,02 m. m. nearly smooth. Confounded with *Ephemerum crassinerve*. -- On thin soil and rocks r. *Amer.* »U. S.»: *Sulliv.*

2.E.hystrix Lindberg. — *Ephemerum* Lindb. manip. muscor. 2 (*Societ. pro flora et fauna fenn.* 1874); *Lesq. et Jam.*; *Ephemeridium* Kindb. (*Ephemerum spinulosum* Bruch et Sch. ?).

»Leaves narrowly lanceolate-subulate, long-spinulose at margins, open-erect or subsecund, not much passing capsule; costa percurrent nearly filling the subulate point, spinulose at back. Capsule large very shortly conic-rostellate. Spores minutely tuberculate very large. — *Amer. r. U. S.*: Louisiana»: *Lindb. l. c.*

Fam. 36. **Voitiaceæ.**

166. **Voitia** Hornschuch.

1.V.nivalis Hornschuch.

Leaves distant long-acuminate not recurved; cells oblong-hexagonal or subrectangular; costa gen. long-excurrent, in uppermost leaves sometimes not excurrent. Capsule subovate-oblong; pedicel thick 2—3 c. m. long. Perichetial leaves obtusate; costa long-excurrent. Spores small. Tufts tomentose 3—8 c. m. high. — On animal dung in alp. region r. *Eur.* Austria: *Breidler.*

2.V.hyperborea Greville et Arnott.

Differs from the last: Leaves broad-ovate obtusate gen. apiculate; costa percurrent or short-excurrent. Shoot-leaves small obovate; costa vanishing far below the short point. Capsule subglobose smaller, sometimes shorter rostrate; pedicel thin less long. Stems us. not tufted. Perichetial leaves not seen. — Arctic distr. r. *Eur.* Spetsbergen: *R. Gyllencreutz.*

Fam. 37. **Physcomitrellaceæ.**

167. **Physcomitrella** Bruch et Schimper.

1.Ph.patens Hedwig. — *Phascum* H.; *Physcomitrella* B. S.

Leaves sublingulate or sublinear acute or short-acuminate; costa subpercurrent. Capsule apiculate; pedicel more or less distinct. Stem us. simple. — Wet clayey soil. *Eur.* not r. Sweden! *Finl.*: *Bomansson.* France: *Brébisson.* *Amer.* »U. S.»: *Lesq. et Jam.*

168. **Aphanorhegma** *Sullivant.*

1.A.serratum *Hooker et Wilson.* — *Schistidium* H. W.; *Aphanorhegma* *Sull.* icon. m.

Leaves linear-lanceolate gen. with long subulate acumen; costa

cells small; ca-
bout 0,02 m. m.
crassinerve. --

anip. muscor. 2
et Jam.; Ephe-
h et Sch. ?).
nulose at mar-
capsule; costa
nulose at back.
pores minutely
na»: Lindb. l. c.

cells oblong-
current, in up-
sule subovate-
etial leaves ob-
tufts tomentose
region r. *Eur.*

asate gen. api-
ot-leaves small
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not seen. —
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per.
rella B. S.
ort-acuminate;
more or less
Eur. not r.
mer. »U. S.»:

H. W.; Apha-
acumen; costa

often percurrent. Capsule globose obtusely apiculate; pedicel short or indistinct. Stem often finally branching. — Wet clayey soil r. *Amer. U. S.*: Sullivan, com. C. Mueller.

2. **A. Hampel** Limpricht (»*Physcomitrella patens* + *Physcomitrium sphæricum*»). — *Physcomitrella* Limpr.; *Aphanorhagma* Kindb.

Calyptra as in the last. Capsule oval with short conic point, pedicel not much shorter. Leaves as in *Physcomitrella*. — *Eur. r.* »Germany»: Limpricht.

Fam. 38. **Phascaceæ.**

169. **Phascum** L.

A. Leaves close to an head-like bud, us. smooth and serrulate.

I. Acaulon. Capsule immersed globose not or indistinctly mamillate; calyptra very short mitriform. Leaves us. serrulate at the mostly recurved borders; costa r. long-excurrent. Monoecious with distinct male flowers. Plants minute.

B. Leaves not densely close, us. papillose and entire (or faintly sinuolate).

a. Capsule not rostrate.

II. Aschisma. Capsule immersed subglobose apiculate; calyptra broad short submitriform, often cleft at one side. Leaves papillose involute; costa subpercurrent. Monoecious with distinct male flowers. Plants minute.

III. Eu-Phascum. Capsule often exserted, oval-globose apiculate or r. mamillate; calyptra us. broad subcucullate or r. mitriform. Leaves us. papillose often reflexed; costa excurrent. Paroecious. Stem often distinct.

b. Capsule obliquely rostrate.

IV. Mildeella. Capsule sometimes exserted, suboval or r. globose; calyptra narrow cucullate. Leaves mostly papillose; costa gen. long-excurrent. Monoecious with distinct male flowers, or dioecious. Stem distinct.

I. Acaulon C. Mueller.

A. Leaves smooth; costa complete.

a. Leaves concave; costa subpercurrent.

1. **Ph. muticum** Schreber. — *Acaulon* C. M.; *Sphærangium* Schimper.

Upper leaves subovate acute or short-acuminate; borders recurved (sinuolate or serrulate) above; costa short-excurrent or percurrent. Inner perichetial leaves of same length, not wholly convolute, us. serrulate and much longer than the short-pedi-

cellate capsule. — *Eur.* Sweden: Berggren. *Engl.*: Rogers. *France*: Brébisson. *Austria*: Schmidt. *Amer.* »U. S., Calif.»: Lesq. et J.

* **Ph. minus** (Hooker et Taylor, as variety) Jæger. — *Ph. muticum* var. *minus* H. T.; *Acaulon* Jæger; *Phascum* Kindb.

Smaller in all parts. Perichetial leaves entire scarcely reaching above capsule. — *Eur. r.* »France and Engl.»: Limpricht.

* **Ph. rufescens** Jæger. — *Acaulon* Jæg.; *Phascum* Kindb.; *Sphærangium* Lesq. et Jam.

»Leaves mostly not revolute. Pedicel of capsule sometimes curved. — *Amer.* U. S. very common in eastern and central states»: Lesq. et Jam.

2. **Ph. mediterraneum** Limpricht. — *Acaulon* Limpr.; Braithwaite; *Phascum* Kindb.; *Acaulon* Holtii Lindb. in litt.

Leaves smaller and narrower than in *Ph. muticum*, entire, gen. not recurved; cells smaller. Perichetial leaves unequal in length; the upper one much longer, wholly convolute and nearly entire. Capsule mamillate; pedicel indistinct. — *Eur. r.* England: G. A. Holt.

b. Leaves carinate; costa excurrent.

3. **Ph. triquetrum** Spruce. — *Acaulon* C. M.; *Sphærangium* Schimper.

Leaves suboval subacute; borders recurved and sinuate often nearly all around; costa excurrent to a short deflexed point. Inner perichetial leaves us. 3 of same length. Pedicel of capsule curved. Plant resembling a triquetrous bud. — *Eur.* *Austria*: Breidler; Schmidt. *France*: Goulard, com. Husnot. *Amer.* Can.: Drummond, com. Macoun.

* **Ph. piligerum** Notaris. — *Acaulon* Limpr.

Leaves with long-excurrent costa. — *Eur.* »Italy»: Notaris.

B. Leaves papillose on both sides; costa not evolute in lower part, long-excurrent.

4. **Ph. Schimperii** Sullivant. — *Acaulon* Sull. icon. muse.; *Sphærangium* Lesq. et Jam.

Upper leaves concave, serrulate and recurved above, subovate with narrow subulate patent or deflexed point. Perichetial leaves subobovate not convolute. Capsule mamillate; pedicel curved. — *Amer.* »U. S. r.»: Sull.

U. Aschisma Lindberg.

5. **Ph. carniolicum** Weber et Mohr.

Upper leaves concave oblong-lanceolate subobtuse, not close when moist; upper cells green round-quadrangle, lower hyaline short-rectangular. Capsule subglobose; pedicel very short. Plants

minute cespitulose. — On sand and earth r. *Eur.* »Mediterr. distr.»:Husnot. *Amer.* »U. S.»: Lesq. et Jam.

III. Eu-Phascum.

A. Capsule with distinct lid; calyptra very papillose.

6.**Ph. rectum** Withering. — Pottia Mitten; Braithwaite.

Leaves entire papillose suboblong or subobovate. Capsule oval-globose exserted; pedicel straight; calyptra cucullate. Stem simple. *Eur.* r. Engl.: Wood. France: Le Jolis. Greece: Orphanides. Italy: Arcangeli.

B. Lid not distinct. Calyptra smooth or faintly rough.

a. Stem and pedicel indistinct. Plant subgemmiform.

7.**Ph. Floerkei** Weber et Mohr. — Microbryum Schimper.

Upper leaves papillose us. oval-ovate acuminate gen. entire, erect or patulous; their point reflexed when dry. Capsule subglobose immersed; calyptra short us. mitriform. — *Eur.* r. France: Brébisson. *Amer.* »U. S.»: Lesq. et Jam.

b. Stem distinct often divided. Pedicel distinct.

8.**Ph. acaulon** L. 1753. — *Ph. cuspidatum* Schreber 1770.

Upper leaves entire erect oblong-lanceolate often nearly smooth. Capsule oval-globose not or scarcely exserted above perichetial leaves; pedicel sometimes curved. Calyptra gen. broad subcucullate, r. short mitriform. — *Eur.* common in plains on fields. Sweden! *Amer.* U. S.: Sullivant, com. C. M.

* **P. piliferum** Schreber.

Leaves narrower, piliferous by costa; upper cells smaller more rotundate. — *Eur.* Sweden! *Amer.* Can.: Drummond.

9.**Ph. curvicolium** Ehrhart.

Differs from *Ph. acaulon*: Upper leaves longer acuminate slightly sinuolate near apex. Capsule wholly exserted; pedicel curved longer; calyptra narrow cucullate. — *Eur.* r. Sweden: J. Persson. France: Brébisson.

IV. Mildeella Limpricht.

10.**Ph. bryoides** Dickson. — Pottia Mitten.

Upper leaves ovate-lanceolate or r. acuminate, entire; costa us. long-excurrent. Capsule suboval; lid distinct with subulate beak; pedicel red. Stem 2—10 m. m. high. — »Peristome rudimentary»: Limpricht. — *Eur.* not r. Germany: Ahnfeldt; Roell. Austria: Schmidt. *Amer.* »U. S.»: Lesq. et Jam.

11.**Ph. subexsertum** Hooker; C. M. syn.

Differs from the last: Upper leaves crenulate-papillose above, sparingly chlorophyllose. Capsule globose; lid not distinct; beak thick; pedicel reddish yellow. Stem 5—8 m. m. high. — *Amer.* r. Can.: Drummond, com. Macoun.

Glossary.

- Alar** (cells) special group at basal angles.
- Alate** (stem) bordered by leaf-substance.
- Angular** (cells) those of basal angles.
- Apiculate** with short point.
- Apophysis** basal enlargement of capsule.
- Appendiculate** with small spurs.
- Areolation** tissue of cells.
- Arista** awn.
- Attenuate** tapering.
- Auricled** with ear-like angles.
- Barren** sterile.
- Beak** tip of lid (of capsule).
- Bifarious** placed on two sides.
- Bifid** cleft to middle.
- Cancellate** latticed.
- Cernuous** drooping.
- Cespitose** forming matted tufts.
- Cilia** hair-like appendages of inner peristome.
- Circinnate** rolled into a circle.
- Comal** (leaves) the uppermost.
- Cochleariform** concave as a spoon.
- Complanate** flattened.
- Complicate** folded together.
- Connate** united.
- Costa** rib of a leaf.
- Cribose** sieve-like.
- Crisped** strongly curled.
- Cucullate** (calyptra) cleft at one side; (leaf) involute at apex.
- Cultriform** like a blade of a knife.
- Cuspidate** tapering to an acute point.
- Decurrent** (leaf) prolonged downward upon the stem.
- Deflexed** bent downward.
- Defluent** running downward.
- Deoperculate** without lid.
- Dimorphous** of two forms.
- Distichous** in two opposite rows.
- Emarginate** notched at summit.
- Entire** without incisions.
- Eradiculose** rootless (without rhizoids).
- Exannulate** without annulus.
- Excurrent** ending beyond apex.
- Fasciculate** collected in small bundles.
- Fenestrate** with dilated apertures.
- Filiform** thread-like.
- Fimbriate** fringed.
- Flagellæ** like a thong of a whip.
- Flexuous** bending inward and outward.
- Fusiform** spindle-shaped.
- Gemmiform** bud-like.
- Glabrous** hairless.
- Habit** general aspect.
- Heteromorphous** of different forms.
- Homomorphous** of like form.
- Hyaline** clear as glass.
- Imbricate** disposed like tiles.
- Immarginate** without special border.
- Immersed** not emergent.
- Julaceous** like a roller (by appressed leaves).
- Lamellæ** small thin narrow plates.
- Lamina** part of leaf (above a sheath).
- Lateral** placed at the side.
- Limbate** with a list (border).
- Lingulate** tongue-shaped.
- Mamilla** small nipple on lid or at apex of a leaf-cell.
- Muticous** without hairpoint.
- Nodose** knobbed.
- Oblong** 3 times as long as broad.
- Obsolete** indistinct.
- Obtusate** not acuminate.
- Oval** twice as long as broad and broader near middle.
- Ovate** egg-shaped.
- Papilla** small rounded prominence.
- Paraphylla** leaf-like appendages.
- Pedicel** stalk of capsule.
- Percurrent** reaching to apex.
- Pinnate** branching on two sides.
- Plicate** folded lengthwise.
- Pulvinate** cushioned.
- Piriform** pear-shaped.
- Ramose** branching.
- Recurved, revolute, reflexed** bent back on the border.
- Rimose** with narrow apertures.
- Rostellate** (lid) with short beak.
- Rostrate** with long beak.
- Rugose** wrinkled.
- Secund** turned to one side.
- Serrate** with teeth as a saw.
- Serrulate** with smaller teeth.

Setaceous bristle-like.
Sinuolate not wholly entire.
Sinuous crenulate at walls.
Squamiform like a scale.
Strangulate strongly constricted below mouth.
Striate with fine furrows.
Strumose with a swelling below.
Sub-; nearly (subovate nearly ovate).
Subulate awl-shaped.

Sulcate grooved.
Terminal placed at top.
Tomentose with soft matted hairs.
Truncate transversely cut above.
Tumid, turgid swollen.
Umbraculiform as an umbrella.
Wing; border of leaf-base, prolonged on stem; (in *Polytrichaceæ*) prominent part of lamina; (in *Fissidentaceæ*) stipular appendage.

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Corrections and additions.

Page 49, l. 27: segments us, split; p. 92, l. 41-42: pedicel rough;
p. 94, l. 14: Amer. N. Foundl.: Waghorne; p. 119, l. 34: alar cells large;
p. 138, l. 24: Capsule small oblong pale, finally whitish; teeth very pale;
segments hyaline; p. 161, l. 14: cell of lamellae; p. 164, l. 23: Leaves
entire; p. 180, l. 40: Leaves of sterile shoots; p. 335, l. 23: N. Foundl.:
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